

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS REVIEW, COPPER AND BRASS
A TRADE JOURNAL RELATING TO METALS AND ALLOYS

OLD SERIES.
Vol. 19. No. 10.

NEW YORK, OCTOBER, 1913.

NEW SERIES.
Vol. 11. No. 10.

THE CHICAGO FOUNDRY CONVENTION AND EXHIBITION

SOME LAST MINUTE INFORMATION REGARDING THE FOUNDRY EVENT OF THE YEAR TO BE HELD IN CHICAGO, ILL., OCTOBER 10-17, 1913.

Secretary Hoyt of the Foundry and Machine Exhibition Company announces in his last official circular that the 1913 exhibition of foundry supplies and apparatus will open Friday, October, 10, at 10 a. m., and will open each day thereafter at 9:30 a. m., with the exception of

Hotel La Salle, the headquarters of the Foundrymen's Association.

annoying delays, he urges that all intending exhibitors get their shipments under way as soon as possible.

The secretaries of the various societies which will hold their annual conventions at the same time as the exhibit, October 10 to 17, have not as yet announced their pro-

A view on Drexel Boulevard.



Michigan Avenue, looking north from Thirty-fifth Street.

Hotel Sherman, headquarters of the Foundry and Machine Exhibition Company.

SOME POINTS OF INTEREST IN CHICAGO, ILL.

Sunday, when the exhibit will be closed to the general public. The exhibit will close each day at 6 p. m., with the exception of Saturday, Monday, Tuesday and Wednesday, when the closing hour will be 10 p. m. On these days power will be shut down from 5:30 to 7 p. m. He also states that there are now 170 exhibitors and that practically all of the space has been taken. Some exhibits have already arrived and, in order to avoid

grams. These societies—the American Institute of Metals, the American Foundrymen's Association and the Associated Foundry Foremen—all have their headquarters at the Hotel La Salle, and it is anticipated that this will prove to be a big improvement over Buffalo arrangements last year when separate hotels were used, thereby causing confusion and inconvenience in finding the different meeting places.

**LIST OF FIRMS TO DATE WHO WILL EXHIBIT MACHINES AND EQUIPMENT
OR HAVE REPRESENTATIVES AND SPACE AT THE FOUNDRY AND MA-
CHINE EXHIBITION, INTERNATIONAL AMPHITHEATER, CHICAGO,
OCTOBER 10 to 17, 1913.**

Acme Machine Tool Co.....	Cincinnati, O.	Crawford Oil & Chemical Co.....	Cleveland, O.
Ajax Metal Co.....	Philadelphia, Pa.	Curtis Pneumatic Machinery Co.....	St. Louis, Mo.
Albany Sand & Supply Co.....	Albany, N. Y.	Davenport Machine & Foundry Co.....	Davenport, Ia.
American Machinist	Chicago, Ill.	Davis-Bournonville Co.....	Chicago, Ill.
American Steam Pump Co.....	Battle Creek, Mich.	Diamond Machine Co.....	Providence, R. I.
American Tool Works Co.....	Cincinnati, O.	Dings Electric-Magnetic Separator Co.....	Milwaukee, Wis.
Arcade Mfg. Co.....	Freeport, Ill.	Dixon, Joseph, Crucible Co.....	Chicago, Ill.
Atkins, E. C., & Co.....	Indianapolis, Ind.	Doggett, Stanley	New York.
Automatic Transportation Co.....	Buffalo, N. Y.	Duplex Shaker Works.....	Chicago, Ill.
Ayer & Lord Tie Co.....	Chicago, Ill.	Emmert Mfg. Co.....	Waynesboro, Pa.
Baird & West.....	Detroit, Mich.	Essley, E. L., Machinery Co.....	Chicago, Ill.
Baker Bros.....	Toledo, O.	Federal Foundry Supply Co.....	Cleveland, O.
Barnes Drill Co.....	Rockford, Ill.	Felt & Tarrant Mfg. Co.....	Chicago, Ill.
Bartley, Jonathan, Crucible Co.....	Trenton, N. J.	Garden City Sand Co.....	Chicago, Ill.
Benjamin Elec. & Mfg. Co.....	Chicago, Ill.	Gardner Machine Co.....	Beloit, Wis.
Barton, H. E., Tool & Supply Co.....	Chicago, Ill.	Gardner Governor Co.....	Quincy, Ill.
Bennett-O'Connell Co.....	Chicago, Ill.	General Electric Co.....	Schenectady, N. Y.
Berkshire Mfg. Co.....	Cleveland, O.	Gill Clay Pot Co.....	Muncie, Ind.
Besly, Chas. H., & Co.....	Chicago, Ill.	Globe Steel Co.....	Mansfield, O.
Birkenstein, S., & Sons.....	Chicago, Ill.	Goldschmidt Thermit Co.....	New York.

CHICAGO CONVENTION OFFICERS.



C. A. PLAMONDON.
President A. Plamondon Mfg. Co.
General Chairman Foundry Convention
Committee.



JAMES A. GALLIGAN.
Pickards, Brown & Co.
Chairman Finance Committee.

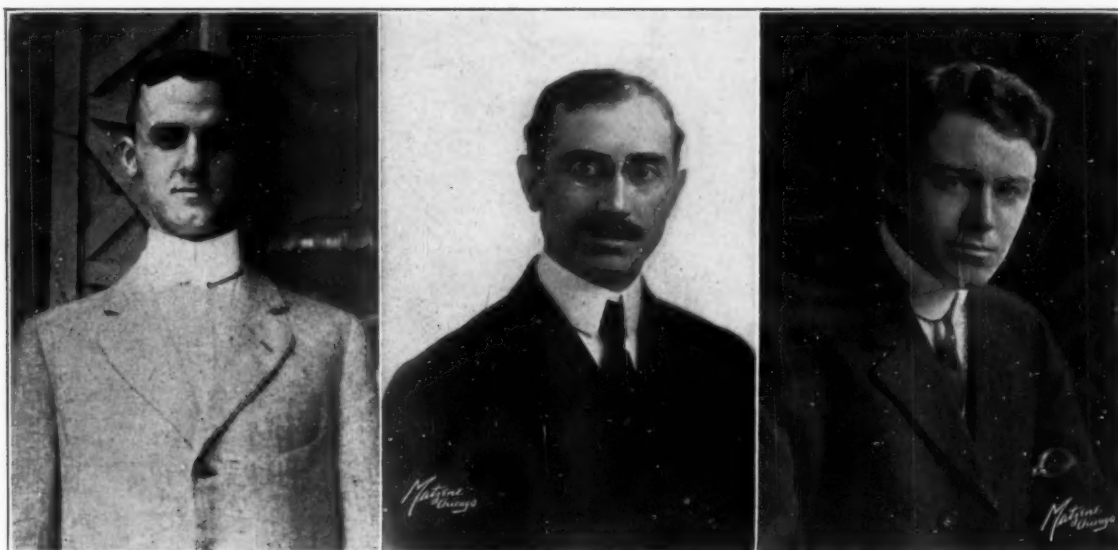


CHARLES B. CARTER.
American Brake Shoe and Foundry
Company.
Chairman Entertainment Committee.

Blake & Knowles Steam Pump Works....	East Cambridge, Mass.	Goodale Co.....	Kalamazoo, Mich.
Blystone Machinery Co.....	Cambridge Springs, Pa.	Gould & Eberhardt.....	Newark, N. J.
Brown Specialty Machinery Co.....	Chicago, Ill.	Great Western Mfg. Co.....	Leavenworth, Kan.
Buch's, A., Sons Co.....	Elizabethtown, Pa.	Great Western Smelting & Refining Co.....	Chicago, Ill.
Buckeye Products Co.....	Cincinnati, O.	Greaves, Klusman Co.....	Cincinnati, O.
Bullard Machine Tool Co.....	Bridgeport, Conn.	Hanna Engineering Works.....	Chicago, Ill.
Calumet Foundry Equipment Co.....	Harvey, Ill.	Hannifin Mfg. Co.....	Chicago, Ill.
Carborundum Co.....	Niagara Falls, N. Y.	Hayward Co.....	New York.
Carter Metal Cleaning Co.....	Philadelphia, Pa.	Herman Pneumatic Machine Co.....	Zelienople, Pa.
Castings	Cleveland, O.	Hill-Brunner Foundry Supply Co.....	Cincinnati, O.
Cataract Refining & Mfg. Co.....	Buffalo, N. Y.	Hill & Griffith Co.....	Cincinnati, O.
Chicago Pneumatic Tool Co.....	Chicago, Ill.	Hoevel Sandblast Machine Co.....	New York.
Cincinnati Bickford Tool Co.....	Cincinnati, O.	Hoskins Mfg. Co.....	Detroit, Mich.
Cincinnati Milling Machine Co.....	Cincinnati, O.	Hunter Saw & Machine Co.....	Pittsburgh, Pa.
Cincinnati Planer Co.....	Cincinnati, O.	Ideal Furnace Co.....	Chester, Pa.
Cincinnati Pulley Machinery Co.....	Cincinnati, O.	Independent Pneumatic Tool Co.....	Chicago, Ill.
Clark, Charles J.....	Chicago, Ill.	Ingersoll-Rand Co.....	New York.
Cleveland Pneumatic Tool Co.....	Cleveland, O.	International Machine Tool Co.....	Indianapolis, Ind.
Cleveland Wire Spring Co.....	Cleveland, O.	International Molding Machine Co.....	Chicago, Ill.
Clipper Belt Lacer Co.....	Grand Rapids, Mich.	Interstate Sand Co.....	Zanesville, O.
Coale, Thos. E., Lumber Co.....	Philadelphia, Pa.	Iron Age.....	New York and Chicago, Ill.
Cowan Truck Co.....	Holyoke, Mass.	Jennison-Wright Co.....	Toledo, O.

Kawin, C. C., Co.....	Chicago, Ill.	Rockford Drilling Machine Co.....	Rockford, Ill.
Kelly, T. P., & Co.....	New York City.	Rock Island Mfg. Co.....	Rock Island, Ill.
Kempsmith Mfg. Co.....	Milwaukee, Wis.	Rogers, Brown & Co.....	Cincinnati, O.
King, Julius, Optical Co.....	Chicago, Ill.	Root, P. H. & F. M., Co.....	Connersville, Ind.
Knickerbocker Co.....	Jackson, Mich.	Sand Mixing Machine Co.....	New York.
Landis Machine Co.....	Waynesboro, Pa.	Sellers, Wm., & Co.....	New York.
LaSalle Machine & Tool Co.....	LaSalle, Ill.	Shepard Electric Crane & Hoist Co.....	Montour Falls, N. Y.
The Lehon Co.....	Chicago, Ill.	Silica Products Co.....	Chicago, Ill.
Lodge & Shipley Machine Tool Co.....	Cincinnati, O.	Sly, W. W., Mfg. Co.....	Cleveland, O.
Lupton's, David, Sons Co.....	Philadelphia, Pa.	Smith, R. P., & Sons Co.....	Chicago, Ill.
McCormick, J. S., Co.....	Pittsburgh, Pa.	Snead & Co. Iron Works.....	Jersey City, N. J.
MacLean Publishing Co.....	Toronto, Ont.	Springfield Machine Tool Co.....	Springfield, O.
McLain, David.....	Milwaukee, Wis.	Standard Sand & Machine Co.....	Cleveland, O.
McLeod Co.....	Cincinnati, O.	Sterling Wheelbarrow Co.....	West Allis, Wis.
Manufacturers' Equipment Co.....	Chicago, Ill.	Stevens, Frederic B.....	Detroit, Mich.
Marshall & Huschart Machinery Co.....	Chicago, Ill.	Stow Mfg. Co.....	Binghamton, N. Y.
THE METAL INDUSTRY.....	New York	Superior Sand Co.....	Cleveland, O.
Midland Machine Co.....	Detroit, Mich.	Tabor Mfg. Co.....	Philadelphia, Pa.
Monarch Engineering & Mfg. Co.....	Baltimore, Md.	Titanium Alloy Mfg. Co.....	Niagara Falls, N. Y.
Mott Sand Blast Mfg. Co.....	Chicago, Ill.	United States Graphite Co.....	Saginaw, Mich.
Mumford Molding Machine Co.....	New York & Chicago.	U. S. Molding Machine Co.....	Cleveland, O.
New Haven Sand Blast Co.....	New Haven, Conn.	Vulcan Engineering Sales Co.....	Chicago, Ill.
Norma Company of America.....	New York.	Wadsworth Core Machine & Equipment Co.....	Akron, O.
Norton Co.....	Worcester, Mass.	Webb, J. F., Mfg. & Supply Co.....	Davenport, Ia.
Obermayer, S., Co.....	Chicago, Ill.	West Haven Mfg. Co.....	New Haven, Conn.

CHICAGO CONVENTION OFFICERS.



H. COLE ESTEP.
Foundry.

General Secretary Foundry Convention
Committee.

WILLIAM FRANCIS.

President Francis & Nygren Foundry
Company.
Chairman Reception Committee.

O. J. ABELL.

The Iron Age.
Chairman Publicity and Printing
Committee.

Ohio Fire Brick Co.....	Oak Hill, O.	Westinghouse Electric & Mfg. Co.....	East Pittsburgh, Pa.
Ohio Sand Co.....	Conneaut, O.	Whiting Foundry Equipment Co.....	Harvey, Ill.
Oliver Machinery Co.....	Grand Rapids, Mich.	Wiener Machinery Co.....	New York.
Osborn Mfg. Co.....	Cleveland, O.	Willard Machine & Tool Co.....	Cincinnati, O.
Oxweld Acetylene Co.....	Chicago, Ill.	Willson, T. A., Co.....	Reading, Pa.
Pangborn Corporation.....	Hagerstown, Md.	Wilmarth & Morman Co.....	Grand Rapids, Mich.
Partridge, E. O.....	Chicago, Ill.	Woodison, E. J., Co.....	Detroit, Mich.
Pawling & Harnischfeger Co.....	Milwaukee, Wis.	Wright Mfg. Co.....	Lisbon, O.
Paxon, J. W., Co.....	Philadelphia, Pa.	Wyoming Shovel Works.....	Wyoming, Pa.
Peerless Parting Co.....	Ottawa, Ill.		
Pennsylvania Steel Co.....	Philadelphia, Pa.		
Penton Publishing Co.....	Cleveland, O.		
Peterson-National Co.....	Buffalo, N. Y.		
Pickands, Brown & Co.....	Chicago, Ill.		
Pittsburg Pneumatic Co.....	Canton, O.		
Prest-O-Lite Co.....	Indianapolis, Ind.		
Pridmore, Henry E.....	Chicago, Ill.		
Q. M. S. Co.....	New York & Chicago.		
Quigley Furnace & Foundry Co.....	Springfield, Mass.		
Quitman Foundry & Machine Co.....	Quitman, Ga.		
Ransom Mfg. Co.....	Oshkosh, Wis.		
Robeson Process Co.....	Pennington, N. J.		
Robinson, W. V., Co.....	Owosso, Mich.		
Rochester Boring Machine Co.....	Rochester, N. Y.		

COPPER IMPORTS.

Until recently the greater part of the copper imported was received from the United Kingdom, but of late Belgian, French, and German firms have secured a hold on the market. The copper from the latter countries is found softer and more malleable than that furnished by British manufacturers. Imports of copper sheets and bars are insignificant. The imports of copper in 1911 totaled 737,328 pounds, and in 1912 the total was 529,655 pounds. Manufactures of copper were imported to the extent of 59,414 pounds in 1911, and 30,093 pounds in 1912.—Exchange.

CHICAGO, THE CONVENTION CITY

A BRIEF DESCRIPTION OF THE CITY CHOSEN BY THE AMERICAN FOUNDRYMEN FOR THEIR 1913 CONVENTION.

BY J. H. HANSJOSTEN.

Chicago, the city in which will be held the convention of the American Institute of Metals and allied organizations, is in many ways the most wonderful city in the world. In 1803, Fort Dearborn was built on the south bank of the Chicago River, and a few pioneers built their log cabins by it, and on August 15, 1812 the post was abandoned. A mile and a half south of the post the handful of soldiers that had garrisoned the post and the few settlers they had under their protection, were attacked by a band of Indians and massacred. A few years afterward, a few hardy and venturesome traders again established themselves on the site of old Fort Dear-

The city is located at the head of Lake Michigan and extends for 30 miles along its shores. It is the center of a thickly populated portion of the United States, and its suburbs extend for miles to the north, west and south, while the southeastern shore line of the lake is dotted with mills and factories in the midst of cities and towns that are practically a part of Chicago, though not included within its corporate limits.

The location of the city is beautiful, having, as stated above, a frontage of 30 miles on Lake Michigan. It has many miles of beautifully shaded boulevards and 4,428 acres of parks, and many fine buildings and points of



PART OF SCREW MACHINE DEPARTMENT, AUTOMATIC ELECTRIC COMPANY, CHICAGO, ILL.

born, but it was not until 1830 that Chicago was surveyed and plotted.

In August, 1833, the town of Chicago was incorporated, and on March 4, 1837, the little frontier community was incorporated as a city. From then on the growth of the city was sure and steady, and when in 1848 the first railroad was opened, the population grew by leaps and bounds. The population in 1840 was 4,479; in 1850, 28,269; in 1860, 109,206, and in 1870, 298,977.

In 1871 the greater part of the city was destroyed by the "great fire" of October the 8th and 9th, when \$200,000,000 worth of property was destroyed. Notwithstanding this great disaster, the population had increased to 503,298 in 1880, and the city has today a population of 2,380,000.

interest. It is the resort center of the Middle West and South. Many thousands of health and pleasure seekers annually pass through it, for it is the gateway of the pleasure and health resorts that dot the Michigan and Wisconsin shores of the lake. The passenger steamers that daily leave the harbor carry millions of passengers annually.

It is impossible to describe in this space the many and varied manufactories of Chicago. Chicago is first on the list of the foundry cities of the United States. The last available census report (United States Census report 1911) shows that it has 9,663 manufacturing establishments with a capital of \$971,900,000. The value of the products of the factories, according to the same report were \$1,281,313,000, while the salaries and wages paid

for the same year were \$240,056,000, and the average number of wage earners was 293,992. The value of foundry and machine shop products was \$51,774,695; of brass castings, \$3,195,077; of electrical supplies, \$16,291,546; of gas and lamp fixtures, \$2,257,653, while the job electro-plating plants did a business of \$327,058.

One of the largest and most progressive of the many brass working and electrical supply manufacturing plants of Chicago is the Automatic Electric Company, portions of whose plant is shown by photographs. Its principal product is the automatic telephone, an instrument that does away entirely with a manual switchboard in the telephone exchange, and is in use in every country in the world where telephones are used. The British government has recently taken over the telephone systems of England and will use the automatic telephone and automatic switchboards will be installed throughout the British Isles. The concern is now running day and night shifts to keep up with orders, several orders from Australia, totaling several thousand telephones, are in process of manufacture, together with similar orders from all parts of the world.

zinc solutions. The current is supplied by 2 direct connected motor generator sets of 2,000 amperes capacity each.

W. Lee Campbell is the general superintendent and the factory is under the able management of W. J. Tewksbury, who successfully installed the efficiency system under which this modern plant is operated.

The Felt & Tarrant Company's factory is another modern plant, one of the many that are a credit to the metropolis of the West. This company manufactures the Comptometer Adding Machines. It is well known that extreme care is necessary in manufacturing these machines, especially in producing the finish on their cases, and they are one of the manufacturers who can see the benefits derived by electro deposition, in finish as well as a protection against corrosion. All inside parts receiving a certain number

of milligram deposit. The views show one corner of the plating department, where everything works with precision and accuracy, and the polishing department. It will be seen that this is a model plant, not alone in equipment, but in cleanliness, light and ventilation. The efficiency system is employed here with splendid results.



MAIN BUILDING, AUTOMATIC ELECTRIC COMPANY, CHICAGO, ILL.



PART OF PLATING AND POLISHING DEPARTMENT, AUTOMATIC ELECTRIC COMPANY, CHICAGO, ILL.

The plating and polishing departments of this concern are among the most modern and up-to-date in the West. The polishing machines are all motor driven, and the plating equipment consist of 5,500 gallons of nickel, 2,400 gallons of copper and brass, and 1,200 gallons of

Oscar E. Servis, the genial secretary of Chicago branch of the American Electro-platers' Society is in charge of the plating department of this plant, a position he has held for 16 years. The plant was laid out by him and installed under his personal supervision.

The Western Electric Company is another of Chicago's great manufacturing concerns, whose products are known and used wherever civilized man lives and works. This great plant is divided into several sub-plants, each of which is a great factory in itself. They make a complete line of electrical goods, including motors, dynamos, telephones and switchboards.

The Crane Company, with its several plants, is one of the largest users of brass, copper and other metals in the country. They manufacture plumbers' goods and many other goods into which the use of copper and brass enters.

Little need be said of the Pullman Car Company, with its acres of floor space, giving employment to so many men that they form a city of no small magnitude. This great plant has for many years made the railway coaches

The following is a list of the principal foundries and plating plants in Chicago:

American Telephone Co.	Greenduck Co.
American Brass Co.	Hill Casket Co.
Aetna Plating Works.	Interior Brass Co.
Allis-Chalmers Co.	Kellogg Switch Board Co.
Anchor Brass Works.	Kohler Die & Specialty Co.
Burdette & Roundtree.	Lawson Mfg. Co.
Bastian & Blessing.	Liquid Carbonic Co.
Baldwin Brass Works.	Mackey & Lovejoy.
Beardsley Chandelier Co.	Marshall Field & Co.
Bishop, Babcock & Becker Co.	Monash Yomker Co.
Benjamin Electric Co.	Mosaic Shade Co.



POLISHING ROOM—FELT & TARRANT COMPANY, CHICAGO, ILL.

that have made traveling a luxury. Robert T. Lincoln, son of the great emancipator, is president of the company.

Among the job plating shops of Chicago, B. Mercil & Sons occupy a leading place, though there are many shops in this line that are modern and up-to-date. B. Mercil & Sons are the oldest job platers in Chicago and perhaps in the West. The business was established by B. Mercil 32 years ago, and they have a modern plant, including mechanical plating apparatus, ball tumbling and burnishing barrel, etc.

The American Plating Works is one of the newer plants and make a specialty of high grade work, and like Mercils, are always busy.

The National Plating Company is another of the larger job plants, whose customers are located all over the West and South.

Chicago Flexible Shaft Co.	National Stamping Co.
Chicago Spring Butt Co.	National Brass Co.
Chicago Brass Works.	Otis Elevator Co.
Chicago Silver Plating Works.	Pason Hardware Co.
Jas. B. Claw & Sons.	Albert Rich & Co.
Curtis Casket Co.	J. E. Robinson.
Crown Novelty Co.	Royer Metal Co.
Columbia Brass Co.	Swedish-American Telephone Co.
Diamond Brass & Machine Co.	Stromberg Motor Device Co.
Dearborn Hardware Co.	Troy Laundry Machine Co.
Domestic Plating Works.	Western Brass Works.
Empire Brass Co.	Western Telephone Co.
Englewood Chandelier Co.	R. Williamson & Co.
Federal Brass Co.	Winslow Bros.
Fidelity Brass Co.	Waukegan Scale Co.
Gilbertson & Son.	L. Wolf Mfg. Co.
	Zenith Plating Co.

THE CLEANING OF STEEL AND IRON

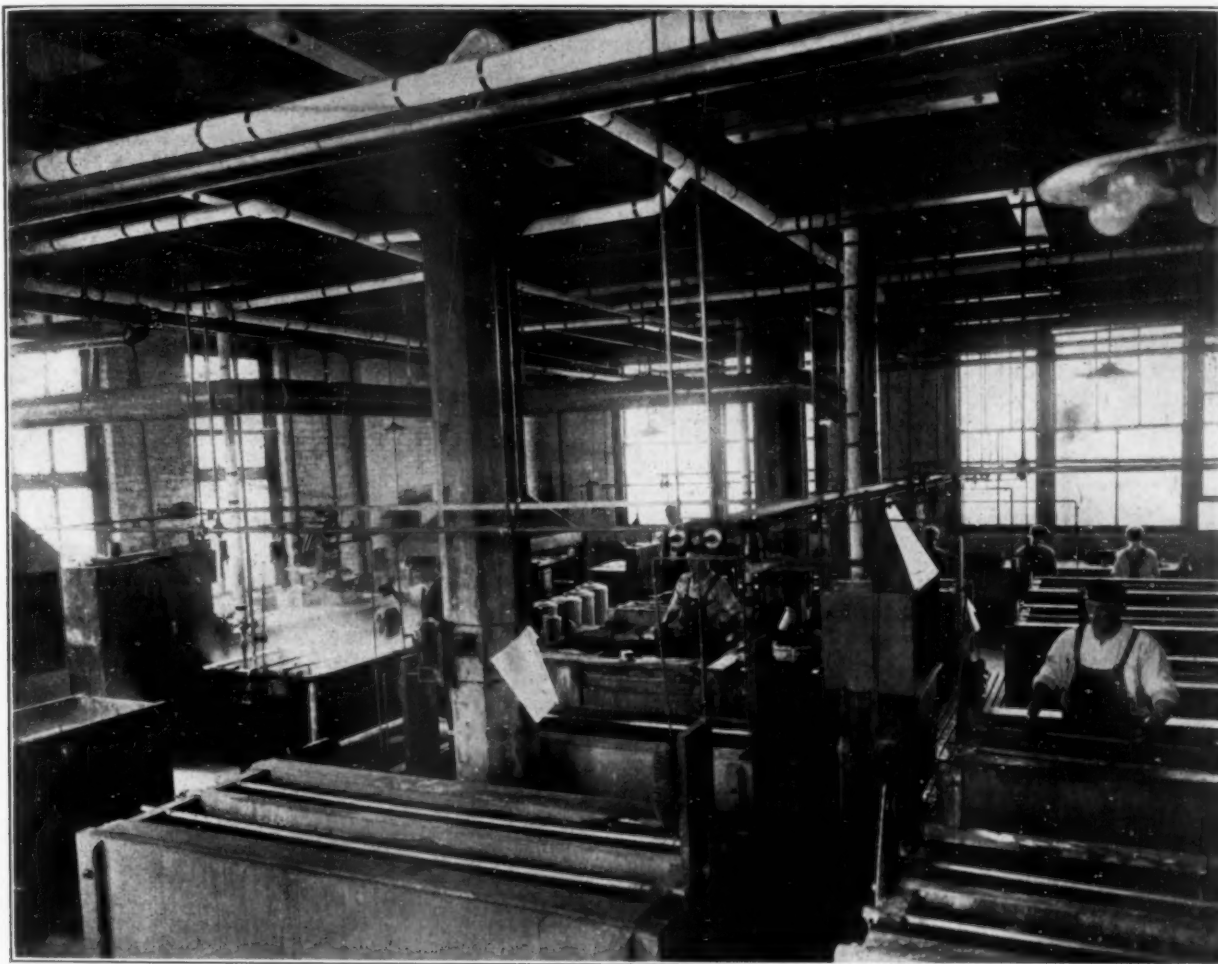
A SYNOPSIS OF A SUCCESSFUL METHOD OF PREPARING THESE METALS FOR ELECTRO-PLATING.

By C. S. THOMPSON.*

There has been so much written and so much discussion of the various methods of cleaning steel and iron that the subject seems to have lost interest among those who should be most interested. The writer has experienced his troubles in cleaning steel stampings and various iron goods which have been treated with heavy mineral oils in the various processes of machining. None of the various cleansing agents sold by the different supply houses have proven entirely

words, about 240 watts to each square foot of surface of work, must be used direct, the same as for plating.

There must be a double throw switch in the circuit, and after the work has been allowed to run for some five or ten minutes it will become coated with a film of bluish white metal, which is potassium or sodium as the case may be, and which becomes black on exposure to the atmosphere. When the potassium or sodium is noticeable to any great extent, the current



CORNER OF PLATING ROOM, FELT & TARRANT COMPANY, CHICAGO, ILL.

satisfactory when used in the ordinary way either as a common hot saponifier or as an electric cleaner, as the electric cleaner is commonly used.

I shall give a process which solves the problem, and if the instructions are carried out, no more troubles will be experienced in cleansing iron and steel of any kind of grease or oil which may be adhering to it. Provided, of course, that the oil has not been burned upon the surface of the iron as in case hardening, etc., which would necessarily have to be removed by mechanical means. The process consists of an electrolyte of either commercial caustic potash or soda, about 1 pound of the caustic to each gallon of water, to which add about 2 ounces of cyanide of potassium. The current, which must be from 6 to 10 volts and about 40 amperes to each square foot to be cleaned, or in other

must be reversed and in a very few minutes the work is clean and bright. Now rinse in hot water, then in cold, and dip in a weak solution of hydrochloric acid and water. I have cleaned large quantities of work by this process, leaving my work run in the cleaner while the plated work was being taken from the tanks rinsed, dried and put away.

This process dispenses with the help required in scrubbing (which is very often unsatisfactory) and permits of a rapid handling of the work. Besides it is cheap to equip for it, as the price of the double throw switch, rods, connections, etc., are insignificant. It also permits the cleaning of soft metals by direct current, provided there is a rheostat between the main circuit and cleaning tank so that the voltage may be regulated.

As commercial caustic soda answers the purpose

*Foreman Plater, General Fireproofing Company, Youngstown, Ohio.

very well, there is no need of patent cleaners for which a fancy price is exacted, and all manufacturers can adopt the one process, thus making a standard cleaner for all platers. It must be borne in mind, however, that it requires considerable current to do the work, and to get the highest efficiency the cleaner must be worked near the boiling point. It does the work when used cold, but more current is required as well as more time.

It has been known to the trade for several years that a solution composed of caustic soda or potash, to

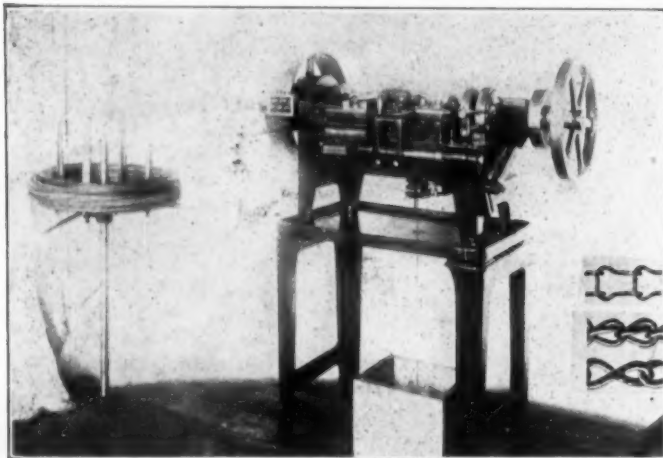
which has been added some of the regular brass solution, will clean iron and steel and deposit a heavy coating of brass at the same time. The deposit of brass, or rather the deposit of copper, zinc and sodium alloyed in the process of deposition and so closely resembling brass, led the plater to believe that there was nothing but the copper-zinc alloy being deposited, the copper taking up the small deposit of sodium and alloying with it completely, concealing it from ordinary inspection.

AUTOMATIC MACHINERY, ITS PLACE IN MODERN MANUFACTURING

AN ARTICLE DEALING WITH SOME NEW LABOR-SAVING DEVICES.

BY ALBERT POTT.*

While, of course, it is well known that more or less automatic machinery has been in use for many years, at the same time there never was the tendency as shown in these days for machines to accomplish as much by automatic means. One of the best evidences of this is the fact that for some years past, while standard machine builders had but a normal business at best and many were often on short time, the leading special machinery builders were working overtime and are yet. Competition is perhaps the chief cause of the demand for automatic machinery. The results from cheap hand labor is far from adequate, besides having many disadvantages, such as excessive floor space, unsanitary conditions, labor troubles, more expense, etc.



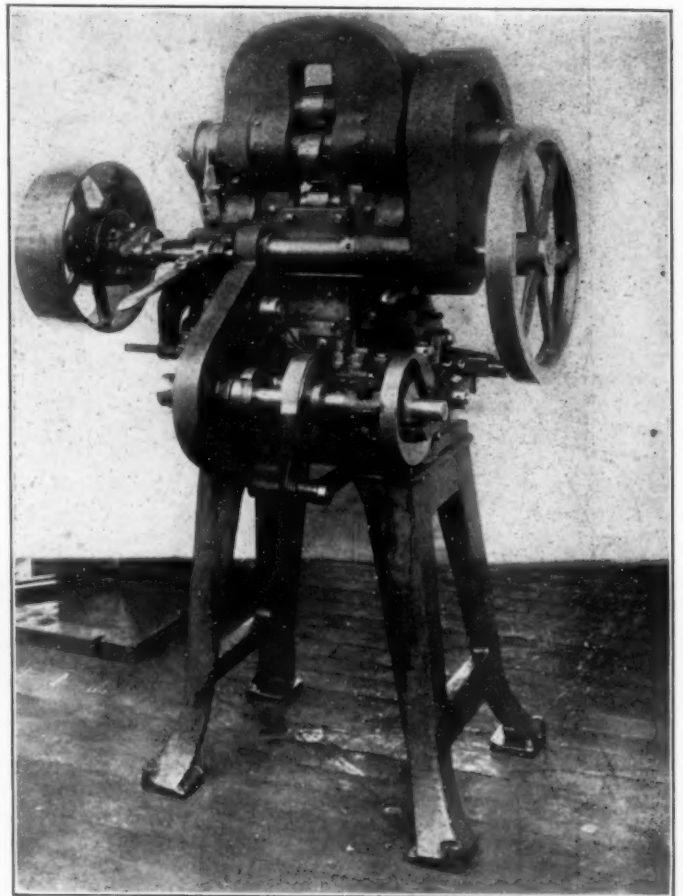
SINGLE OR DOUBLE JACK CHAIN, AND LADDER CHAIN MAKING MACHINE.

Such chain made in one operation at from 60 to 200 links per minute, depending on size.

Automatic machinery is now being designed and built that can and is being successfully operated without skilled labor, but by intelligent help and supervision of a tool maker to take care of the retouching, adjusting and re-making of tools, etc., many bright young men being found particularly adapted for just such work, and who take a pride and interest in these almost human machines. There is, of course, a limit to what ought to be attempted on automatic machines, and old, reliable and experienced designers and builders of such will not now quote on or undertake the construction of such machines unless they feel they will turn out to be a good working practicability, because it not only is a source of trouble and annoyance, to say nothing of expense to the operating concern, but reflects to the disadvantage of the designer and builder.

*Baird Machine Company, Bridgeport, Conn.

In order to decide whether automatic machinery would be warranted or not, perhaps the first thing to consider is the quantity of the article to be made that would be required in a given time. If quantities enough are in demand to keep a machine busy, then it is almost safe



AUTOMATIC SHEET METAL CHAIN MACHINE.

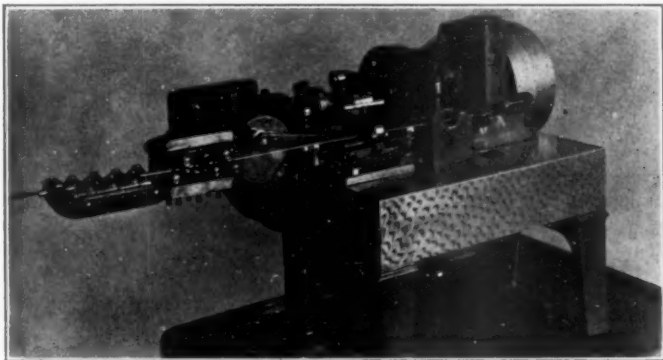
Takes metal from coil and drops such chain known as plumbers' and sash chain complete in one operation; 125 links per minute.

to conclude that the automatic machine would pay. If, however, the machine would make a year's supply in a few days, then the machine might or might not pay, depending on the cost of cheap hand or foot machines, labor, etc., in comparison to the greater first cost of the automatic machines. In order to arrive at the matter most intelligently, an exact example of the article should be sent, showing exactly the size and kind of material, its true shape, etc., together with a statement as to the

quantities consumed in a year or so, also any modification that can be made in the article to cheapen it, or calling attention to any points of importance, so that the designer has a full understanding as to what is required. Ideas of several ways the article could be manufactured may be then prepared, which could then be considered and perhaps one decided on to meet the conditions.

The importance of allowing the designer time enough to carefully experiment and consider the design from several points of view, to lay out several ideas and consider which is best before deciding, also proper time for the making of patterns, obtaining good acceptable material and for the proper machining and fitting of same as well as the careful making of tools, is not given as much thought as should be by the buyer generally. The first machine or the first set of tools are always the slowest to make and the most expensive, as much study, cutting and trying, etc., is necessary, which experience and tools are used as a guide in making others. It is not always best or quickest to accept the first design laid out.

This reminds one of the story of the party who was being escorted through the drafting department of a machinery building concern and was much interested. As they were about to leave the room, the party asked where the models were to which the men worked. The guide pointing to the head of one of the designers, said "In



CLIP MACHINE.

Takes wire from coil and drops clip complete in one operation; 450 per minute.

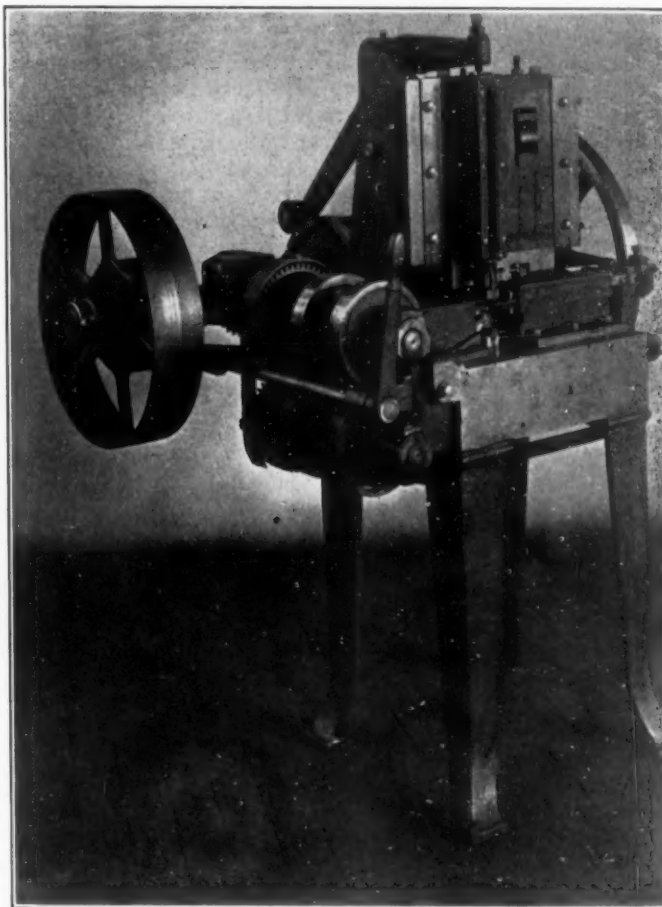
there. There are no models in most of our work, but these men are originating machines." One wonders where this party supposed the first model came from.

The designing and building of special machinery is much different from standard machinery, as even if the standard machine is not in stock the constructing of same is much easier and more straightforward, and generally jigs, fixtures, etc., can be used which cannot in the special machine. The estimating of such special automatic machinery takes much very careful study, in order to make a definite and guaranteed proposition, and the builder has to be well sure of his ground in making same, as to have such machinery left on his hand would be practically a total loss, being entirely different to handling standard machinery. It is but fair, therefore, that he be given all necessary information and a correct sample.

For instance, samples have been received made from soft wire, with the request that the article be considered as to be made from some hard wire of different material, and that it would be different from the sample in certain places in some ways, leaving the designer wondering just how much "a little here" or "a little there" was really meant by the inquirer. Sometimes this is so indefinite that either an exact sample or drawing is requested, but sometimes a chance is taken on what is meant being understood and a price quoted on a machine to make same,

only to have the inquirer send a corrected sample sometimes with an order to proceed, but sample, while perhaps not a great deal different from the original, still enough different to require adding extra mechanism, in cases amounting to several hundred dollars extra, in which case the whole proposition had to be gone over.

On the other hand, as an opposite case a sample of spring was received, having one end bent directly across the center. This one feature prevented its being made in one operation on a standard coiling and cutting machine. A special machine was therefore quoted on, at a much higher price, of course. After going over the reason for this with the inquirer, he stated that the bent end was so made because they, by their present methods, could not make it otherwise, and it was not only not



BURNER TUBE MACHINE.

Makes lamp and lantern wick tubes in one operation, taking the flat metal from the coil; 85 per minute.

needed, but it was undesirable. The proposition was then gone all over and the standard machine quoted on, after much loss of time and trouble, to all concerned, and which could have been saved, had this point been mentioned in the first place. The fact that the designer does not know all about every article presented, or know as much about any one article as the inventor or manufacturers of it, does not seem to be properly appreciated as it ought to be by the inquirer.

Recently a sample of wire form was received, made from about 3/32 inch soft wire, bent back on itself in some places, and with the request that we quote on a machine to make it, but of 3/16 inch hard spring wire. Now, while it might be possible to so make the articles, we believed, if the inquirer realized what a proposition he had, he would consider long before deciding to go

ahead. He was asked to make a sample of the proper wire just as he wanted it, but needless to say we have heard nothing since. Again an inquiry is received for a machine to make a certain article in large quantities, and, on following up with a personal call to get all information, find that said large quantities look large because the inquirer is laboriously making them by hand, whereas an automatic machine would make all he could use in a year in a week or so.

The writer remembers one case where, on asking for information as to quantities it was desired to turn out in a given time, the machine builder was told it was none of his business. What was wanted was a price on all the machines that could be used, and they would make the selection. Just as expected, it turned out the party wanted the cheapest thing he could get and no more needed an automatic machine than a cat needs two tails. Established and experienced manufacturers, of course, have long since learned the importance and necessity of these details, and little trouble is experienced with them by the special machine designer and builder, but they must heartily co-operate. Many amusing incidents, however, occur when dealing with the inexperienced in special machinery.

There is the type of inventor who is so wrapped up in his invention and afraid that it, or ideas from it, will be stolen from him that he will refuse to show a sample and yet desire to be given a guaranteed proposition on an outfit to make same. Another type is the one who offers part interest in his invention in return for the machinery to make same, and who feels that one desires to take it all or make something better if his offer is not taken up. Then there is the one who feels hurt if you do not enthuse with him over his invention—when in most cases you have no idea of its use—and if he orders machinery and later does not make a success of his project, wants the builder to take it back, sometimes saying because he was encouraged to order by your enthusiasm; or, on the other hand, if you do not enthuse, he feels his ability and genius is not recognized, his feelings are hurt and he goes elsewhere to place his order.

Others that one meets are those who have an idea—sometimes very vague—of an article which they believe will prove a great seller, and, as it would be "so simple" for us to perfect the idea and build the machinery to make it, are willing to give us the idea for a nominal sum or for a share of the profits on the sales, etc.; or, if we will design and build the first machine at a cost to enable him to start with as little expense as possible, he will—when his business increases—place his orders for the other machines at a handsome profit. One cannot count their chickens before they are hatched, however, in the special machinery business. In choosing a designer and builder for automatic machinery, too much stress cannot be laid on the fact that the very best should be sought, as even the best cannot be any too good. As one goes to the blacksmith to get his horse shod so should one in need of a special automatic machine go to one who makes that his special study, and because, like poets, special machinery designers are born, not made, having natural ability for such, one is more apt to obtain the desired results.

Only too often have we known especially inexperienced men to place their order because they got a machine for less first cost, only to find that it was clumsily and poorly designed, cost more to operate, both for power and attention, often in the repair shop, and thus only a low average production obtained and high cost for attention and upkeep. Better to pay a good concern a reasonable price to get the best, a machine carefully and well designed, to get light, strong, easier and quick movements, tools as

easily adjustable, interchangeable and as get-at-able as possible, properly designed and properly constructed cams, etc., as well as good material and workmanship throughout.

Several years ago a gentleman called on the leading designer and builder in its line in regard to several machines to make a very common domestic article. He had received bids from several other concerns and, after getting this new bid, stated that the price was high and delivery altogether too long. The estimates were carefully gone over, but no mistake was found. It was tried to show him how impracticable it was for any one to build such machines of the quality to be furnished in the time stated, as the making of the new designs, patterns, getting castings, etc., besides furnishing and putting the various parts together, and then the slow careful operation of making tools for each must of necessity cost more and take more time than he stated. It made no difference, however, but he was bound to have his own way. Nearly two years later the order was left with the aforementioned concern, and the gentleman stated that he had only just got his other machines—over 18 months overdue—and he only got them then by furnishing extra money with which to complete them, and he was already well satisfied the machines now he had were only good for the scrap heap, where they went when the next were finished.

Sometimes a party will consider placing an order for a machine to cost several thousand dollars, entirely new and special, requiring new drawings and patterns, and then expect to get the machine in about two months. If such machines could be originated and completed in such short lengths of time at such prices, there would probably be more nearly the profit there ought to be than there is. Finally, should any reader be in a position to consider placing orders for automatic machinery, let him first learn who are specialists in their line, choose one in whom he can have all confidence, then give exact samples or full information as to just what you want, and then give the party time enough to give you the best he knows how to, and there will be good chances of all concerned being eventually satisfied.

INDIAN ALUMINUM INDUSTRY.

UNITED STATES CONSUL HENRY D. BAKER.

Mr. Alfred Chatterton, commenting in the Madras Mail on the imports of aluminum into India during the 12 months ended March 31, 1913, which amounted to 4,010,608 pounds, valued at \$850,485, states:

Regarding this industry merely as a substitution of aluminum for brass and copper, the economic result is not very important, since it is merely the substitution of one imported metal for another. But it may be assumed that the hygienic qualities of aluminum as compared with brass and copper render its extensive use by the people of India a matter of some importance. Further, from an industrial point of view, the methods pursued in the manufacture of aluminum wares are a complete revolution on the processes formerly employed in metal working and mark a great technical advance. It must be remembered, however, that the main idea underlying our efforts to create a market for aluminum in India was that it was only a necessary preliminary to the establishment of hydroelectric works for the manufacture of the metal from raw material existing in India. It may be safely said now that the market for aluminum in India is sufficiently large to justify the establishment of such a factory. It is reasonable to expect that the use of aluminum in India will continue to extend, and in a few years' time might rise to anything from 5,000 tons to 10,000 tons, valued at \$2,500,000 to \$5,000,000. The Geological Survey of India has indicated various lateritic deposits as suitable sources of raw material, and on the Western Ghats there are sites where the water power can be conveniently developed.

BRASS FOUNDRY FURNACES

A RECITAL OF METAL MELTING PRACTICE, THE OPEN FLAME FURNACE VS. COAL OR COKE CRUCIBLE FURNACES.

BY W. H. PARRY.*

For the past ten years at least war has been waged between the believers in the open flame furnace and those opposed to its use for the melting of bronze. As a believer in the efficiency of the open flame furnace after an experience covering about six years, a recital of a few facts gathered at random may be of interest to the readers of THE METAL INDUSTRY, particularly those who have permitted themselves to be dissuaded, when they had about made up their mind to install an open flame furnace to use fuel oil, and have instead spent a lot of money either for a fuel oil burning crucible furnace or one that uses coal or coke as fuels with crucible containers.

The main objection to the open flame furnace is the necessity for the transfer of the molten metal from the furnace to crucibles or ladles, the claim being made that the loss of heat in doing so makes for bad castings, particularly on light work. It must be admitted there is something in it, but if proper precaution is taken, a lot of trouble from this source can be remedied by the pre-heating of the pouring containers. Again it is claimed that by reason of excessive oxidation the molten metal does not run as freely as metal melted in a crucible and again we admit there is something in that claim too. The opponents of the open flame furnace also assert that castings made from metal melted thusly are seldom, if ever, free from oxide spots, hence are not fit for pressure work and "By Heck" they are right again, but only to this extent, that the metal if properly skimmed after poling will be clean enough for all purposes.

These then are the three main objections to the open flame furnace, and we propose to show that with proper handling the open flame furnace can produce as good work as the crucible furnace can, and for a lot less money per pound. We use two open flame furnaces with a capacity of one thousand pounds each to a heat and we can run down this amount of metal in from sixty-five to seventy-five minutes after the first heat has been taken off in the morning, and we re-line our furnaces only once a year, our average number of heats per year being 3,666, which figures up about six heats a day for each furnace.

Now, as our bronzes show on an average 86 parts of copper, 5 parts of tin, 5 parts of spelter and 4 parts of lead mixture and our sprues and gates are always at least 33 per cent. of our heats, it follows that this mixture which is not the most fluid in the world and the 33 per cent. of sprues and gates are not the very best conditions to work under, and when we get, under these conditions, only thirty-seven one-hundredths of one per cent. of bad castings for the year, we take off our hat to the open flame furnace and bid the crucible furnace a lasting farewell.

There is no trick in getting these results, and anybody with a modicum of common sense and whose prejudice in favor of the antiquated crucible furnace is not so strong that it will curdle milk can accomplish them. We melt our copper and chips first, placing the chips on the bottom and the copper on the top. When fluid the slag is hoed off and heat turned on five minutes more, when the sprues and gates are added, and a few minutes before pouring the white metals are thrown in and the oil and air are turned on once more for the final whirl of five minutes or so. At the end of which time we pole the metal with a green hickory branch and, believe us, it is not so green

either. When after the final skimming we are ready to pour the metal into our ladles that have been previously heated to a red heat in a pot close by the furnaces. We use a pouring gang and do not allow our molders to do any of the pouring, consequently there is no fuss and feathers while the pouring is going on and we frequently pour a line of molds sixty feet long at that, with the contents of one ladle. If that is not good enough for anybody, when you consider that 99 per cent. of our molds are 12 x 16 x 5 inches, then we say to the doubters there is no need for further argument.

That metal will form oxide in an open flame furnace cannot be denied and it would be foolish for anybody to contend otherwise and its formation is fraught with danger if good castings are to result. The usual method even in crucible furnaces is to cover the top of the metal with charcoal to prevent oxidation, and, as this method is hardly practical in an open flame furnace, we resort to poling, skimming and the liberal use of anthracite pea coal which we find accumulates a lot of the slag and forms a skin that prevents further oxidation.

That oxidized metal will not flow as freely as metal not thus afflicted admits of no doubt and on very thin work is apt to "trap" the flow, yet we pour a lot of very thin castings that are only one-sixteenth of an inch in thickness and cover a good distance in the mold, and if we can "get away" with it there is no earthly reason why everybody who operates an open flame furnace cannot do the same if they follow the "dope" as given here, which is intelligent melting. The use of as little "foreign" scrap as possible, and by "foreign" we mean scrap that is not produced at your plant, but at the other fellow's. And last but by no means least be careful not to burn your metal, which is only another name for oxidation, more particularly if you use copper in the shape of fine wire or clippings whose surface area is proportionately large to its weight.

In describing how we get results we have avoided all technicalities for the most excellent reason that we would not know how to use them, as our technical education was such that we would be ashamed to look a college in the face. As to the expense of operating open flame furnaces as against the crucible furnace we can state that there is really no comparison, as the cost per pound in favor of the open flame is so ridiculously low that it is strange that they can find a market for the sale of crucible coal or coke furnaces. Can you imagine anything cheaper than melting one hundred pounds of metal with two gallons of oil at six cents a gallon with no ashes, no dirt and no nonsense such as always accompanies the melting of brass in a crucible when the preliminaries before and after hauling the crucible out of the old-fashioned pit furnace are enough to make a horse laugh. Of course, crucibles, coal and charcoal, do not cost much, the old-fashioned chaps will tell you; but, when you get right down to "brass tacks," the cost of melting metal with fuel oil in an open flame furnace is so small when compared with crucible furnaces that by its use you will save so much money that you can well afford a trip to Philadelphia to laugh at the mint.

Gentle reader, do not for a moment think that we are working for John D. Rockefeller when we sing the praises of fuel oil, as, while we have not the least objection to being placed on John D.'s payroll, yet until we are shown to the contrary, notwithstanding the wild

*Superintendent, National Meter Company, Brooklyn, N. Y.

claims of the local gas companies that they can melt brass cheaper than by any other method with their "eighty cent" gas, we will stick to the fuel oil for a while longer, although we know that it is not as good as it used to be by reason of the fact that the enormous demands for gasoline have compelled the oil people to

"squeeze" it some more to get the last drop of gasoline, so as to be able to furnish the publishers and editors of our trade papers the wherewithal to propel their seven-passenger touring cars past the doors of the poor fellows who furnish the brains and the copy for their magazines. [What about the paperman and printer, Mr. Parry?—Ed.]

BENEFIT OF MELTING OVER PLATINUM CLIPS AND FILINGS IN YOUR OWN FACTORY

SOME PERTINENT ADVICE AS TO HOW TO GET THE ACTUAL VALUE FROM METAL WASTE.

By MORRIS ADELSTEIN.*

If you are a manufacturer of platinum jewelry, in all probability you have tried, at least once or twice in your manufacturing career, to melt over your own clips and filings, and—ten chances to one—you have failed utterly to secure a satisfactory result. As a matter of fact, while a much higher temperature is required to melt platinum than gold or other precious metals (3,200 degrees Fahrenheit), this temperature is very easily attained with a modern oxy-hydrogen torch such as is shown in the outfit pictured here. And neither is any great degree of skill necessary in the manipulation of this torch—as is proved by the fact that uniformly successful melting results are being obtained at the present time by more than one hundred shop foremen with this simple apparatus. When you turn your platinum filings over to a refiner for credit, or to be melted and made into plate, you are charged 10 per cent. for what he terms "loss in melting."

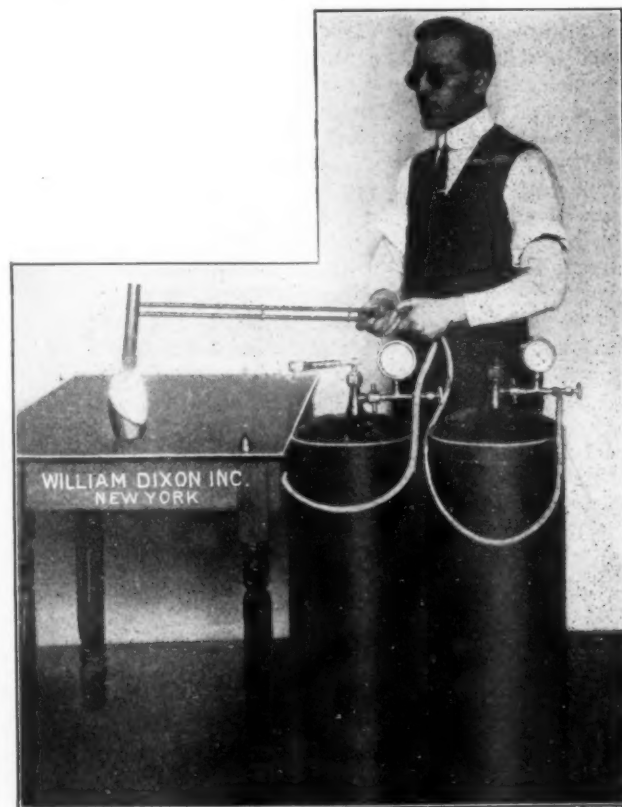
Mind you, the refiner claims that this loss averages 10 per cent. of the platinum filings you send him, yet the actual loss when you do it yourself with proper apparatus is only 1½ per cent.—quite a different proposition. In addition to the 10 per cent. charge for loss, the refiners in New York City charge \$1 to \$3 an ounce for remelting platinum filings. They charge 60 cents to \$1 an ounce for remelting platinum clips. Elsewhere these charges are somewhat higher. Send five ounces of your platinum filings to a refiner and you are charged for half an ounce loss in weight—worth, at current rates, about \$23—plus \$15 (\$3 an ounce) for remelting, or altogether \$38 for smelting the five ounces. You can smelt this same quantity of filings in your own shop in a few minutes, and the cost will not exceed 12 cents an ounce, plus 1½ per cent. actual loss—which amounts to \$4 all told. The actual cost for smelting the five ounces would not be over 60 cents, which is merely the cost of the gas and the man's time.

The time for melting a five-ounce lot of clips should not be over one minute after a man is practical in melting. The writer has melted ten ounces in a minute and a half a number of different times. Filings take twice as long, and those also must be melted twice in order to have the resulting metal in good workable condition. Should you be using 10 to 15 per cent. iridio-platinum, the refiner will only give you credit for soft platinum on your filings. This is a dead loss to you of \$4 to \$5 an ounce in addition to the other charges. By melting your own platinum, you of course get back the same percentage platinum which you had when you began—you get back full value. No borax or flux of any kind is necessary in smelting platinum clips and filings.

One hundred feet of oxy-hydrogen gas will melt about two thousand pennyweights of platinum. The cost of this gas in New York City is six cents a foot for oxygen and one cent a foot for hydrogen; outside

of New York City about ten cents a foot for oxygen and two cents a foot for hydrogen. For the benefit of those who have platinum melting outfits, we here give detailed instructions for regulating the flame, etc., which, if followed, will help materially in getting good results.

For melting platinum clips: First turn on the hydrogen until there is quite a large flame; then turn on enough oxygen to give a purplish-blue flame. You will naturally increase your flame according to the



PLATINUM MELTING OUTFIT. WM. DIXON, INC., NEW YORK.

amount of platinum you are melting. Starting at the front of the crucible, work the flame in circles around the edge; do this until the platinum is melted down to the bottom or center of the crucible; then keep moving the flame around the molten platinum as if you were stirring it. When the platinum moves around freely, so that you can see the bottom of your crucible, it is then thoroughly molten. Take the flame away, shutting off the oxygen first (as this is your more expensive gas), then the hydrogen.

In melting platinum filings you proceed in the same way, but it is advisable to start with a very soft flame until the filings get red; then keep on increasing both gases until the full usual flame is attained and your

*Expert with William Dixon, Inc.

filings are thoroughly molten. After rolling out the resulting mass as smooth as possible, cut this up into clips and remelt; then forge it into whatever shape is wanted, and roll to the thickness desired. A word of caution here may serve some operators from burning out the tips of their torches when melting platinum. This is due to not getting a proper flame. Too much oxygen is turned on and not enough hydrogen, making a backfire into the torch and causing the flame to burn through the tip. More than 100 manufacturing jewelers in and about New York City, nearly all of whom have in the past experimented with other outfits for melting their platinum, are today using the outfit here described.

INSTRUCTIONS FOR MELTING AND WELDING PLATINUM.

A good many manufacturers of platinum jewelry have to send their work outside to be welded, entailing a loss of time—from half an hour to several days (in the case of out-of-town shops)—in the completion of a piece of work, besides the constant expense for welding.

Often there is not time to send the work away to be welded, and it has to be soldered and delivered with a seam showing. A customer has a right to complain or return a ring, and often does, if the seam shows. A ring, moreover, with a soldered joint opens up while being rounded on the mandrel and must be soldered over.

All this is avoided by doing one's own welding. Welding makes a perfect job and a permanent one; it makes the article actually one piece, unbreakable, and after it is polished there are no marks or seams visible.

Welding by means of oxyhydrogen gas, using a small torch like that shown, is very simple. A practical jeweler will find it as easy to do, after a little practise, as soldering. No borax or other flux is required.

Let us suppose you have a ring to weld. First, see that your joint is close; then wrap a thin strip of platinum around the joint (you can use the same grade of platinum as your ring) and apply your flame, gauging it according to the size of the weld.

Should you, while inexperienced, happen to melt the ring a little somewhere it does not matter; you can weld on a little piece of platinum and make it as good as new.

After a little practise you will be able to weld a platinum setting into a platinum shank with no difficulty and to build up the broken prongs of a setting by welding on small pieces so that the setting will be strong and perfect, with no danger of the setter breaking off the new prongs, as is often the case when prongs are soldered on.

How many times a mistake is made in the size of a ring and not discovered until the ring is finished, or perhaps in the hands of the customer! Either a piece must be taken out or a piece put in. Soldering would be unsatisfactory. You can weld this ring by means of the small welding torch without danger of injuring the stones. The writer had no trouble in welding a size "three" ring set with 20 diamonds and 12 sapphires.

A Los Angeles concern recently had a difficult experience in baking a gipsy ring. In the first place, the firm used 35 penny weights of platinum to make a ring that weighed eight pennyweights. Had the firm been able to weld it could have made the ring from 12 to 15 pennyweights of platinum by building up for the setting. In shaping this ring on the mandrel

the soldered seam opened up six times. An when the ring was delivered the customer returned it "because the seam showed." After making several attempts to repair it, the concern had to make an entirely new ring, and this time it was sent to New York to be welded, entailing a wait of 10 days.

The cost of doing your own welding is from one to three cents per operation for gas and a few minutes' time.

ALUMINUM AS FLUX.

Iron-founders have long known that aluminum is an excellent flux. As it oxidizes very easily at the melting temperature of cast iron and steel, it takes from the oxides of these metals their oxygen, forming in the melted mass the insoluble oxide of aluminum, called alumina, which passes into the slag. This oxidation takes place with considerable development of heat, according to the chemical formula $Al_2 + O_3 = Al_2O_3$, 391,000 calories, an amount of heat sufficient to raise the temperature of one kilogram of iron 1,400 degs. C., or one pound avoirdupois 5,544 degs. F. Thus heat is taken up by the melted metal and causes the sudden foaming of the mass. It is better to use the pure metal instead of ferro-aluminum. A little piece of the former is thrown into the ladle, and a very small amount of melted metal is poured upon it, enclosing it and yielding the necessary heat required for melting. As soon as some of this metal has been transferred to the pouring ladle, there is noticed a sudden and forcible foaming, accompanied by a rise of temperature; and the mass appears almost transparent.

The energetic movement noticed in the pouring ladle brings the various molecules of the metal successively in contact with the air, which favors the formation of iron oxide, that is again absorbed by the metal, causing a rapid cooling of the iron mass as soon as the aluminum is added. To avoid this trouble, pouring must take place at once.

But this re-oxidation can be readily handled, says "Der Metallarbeiter," by covering the melted iron or steel mass with sand or charcoal. In order that the reaction may take place under favorable conditions, it is necessary that the melted material shall have a high temperature. If this is not attained, the effect of the addition of the aluminum is almost nil.

If a very heavy piece is to be cast, one must wait until the reaction in the ladle is finished; otherwise aluminum will be carried over into the casting. If, however, thin pieces are cast, the pouring must take place at once. Besides this, it is necessary to note that only so much aluminum must be added as is exactly necessary to effect the oxidation, so that none will stay in metal form in the molten mass; as aluminum is unfavorable to the remaining in a liquid condition.

The effect of the aluminum is also shown in the fact that by the foaming of the melted metal the uncombined gases are thrown off. In Langley's experiments in Pittsburgh this fact was very plainly shown in the gas bubbles which passed off from the melted mass, and which were composed of the hydrogen, nitrogen and carbonic acid that at the moment of hardening of the mass were set free and enclosed in the metal.

As it has been shown that carbonic acid gas is decomposed at a temperature lower than that of the melting point of steel, this decomposition causes the steel to remain longer liquid. The amount of the fluxing metal necessary to be added depends on the quality of the steel and the purpose of the casting. For steel with 0.5 per cent. carbon there may be added about 160 to 320 grams of aluminum per ton; while for a higher carbon steel only 150 to 250 grams are necessary.

ROBERT GRIMSHAW.

THE ART OF SOLDERING ON WHITE METAL

AN ARTICLE GIVING SOME VALUABLE ADVICE ON THIS SUBJECT AS WELL AS SOME RELIABLE FORMULAE.

BY METT MCKUNE.

My only excuse for this article is that though I have been a reader of *THE METAL INDUSTRY* and other similar magazines for many years, I have yet to see an article on this subject, and lest the reader should accuse me of egotism, I will say that at present I am not in the business, and may never be again. Little is known about the art of soldering, as applied to the making of silver ware using Britannia metal, or as it is now more commonly called "white metal" as a base. When I class soldering among the arts, I do so with a knowledge of the meaning of the word, and a knowledge of the business gained from seventeen years of experience.

When one mentions soldering to the uninformed, he immediately thinks of the copper or as it is more commonly called, the soldering iron, as being one of his tools, while this is used by tinsmiths and others to a large extent and is sometimes used by manufacturers of such articles as dining room and portable shades, yet for the most part it is used only for the rougher class of work and has no part in the work done by the silver solderer.

TOOLS AND EQUIPMENT.

Of the tools if not the most important, at least the one absolutely necessary for a solderer to have, is the blowpipe, or lamp. This is usually made of $\frac{5}{8}$ -inch brass tubing about 12 inches long, eighteen gauge, bent to form a right angle at about $1\frac{1}{2}$ inches from the end to prevent the tube buckling, and to help in the bending it is first filled with pitch or lead. After bending the tube is heated and the filling run out. This is the gas tube. A hole is then filed or drilled in the top of the tube exactly at the bend. Into this is inserted and soldered the wind tube. This is a taper tube about eight inches long, having an outside diameter at the smaller end of one eighth of an inch; the larger end being about one quarter of an inch in diameter. The opening in the smaller end is large enough to permit the inserting of a twenty-four gauge wire, which is often done to remove the oxide which forms and clogs the tube. This tube is bent to conform to the gas tube in shape, and the smaller end inserted and soldered to it. The proper adjustment of this tube is a matter of much delicacy and often takes considerable time. The wind tube must be exactly in the center of the gas tube, and about one eighth of an inch from the end. I presume every apprentice makes at least one of these soldering lamps, and every workman has his favorite. While they do not permit of much variation in their construction, yet the best lamp of one man might not suit his neighbor at the bench.

The taper tube is extended by soldering a slightly larger tube to the large end, making it of equal length to the gas tube, and is braced by soldering small bushings or balls between them, the distance between the two tubes being about one quarter of an inch. A piece of heavy wire, say about ten gauge, is bent into a hook and soldered onto the under side of the lamp to hang it on when not in use.

The lamp is connected by two pieces of rubber hose, about six feet long, to the gas, and wind pipes running along the back of the bench, the supply of gas and wind which governs the size of the blaze being controlled by gas cocks placed in both pipes. It is to these the two pieces of hose are attached. One other

tool of importance is the gig, or turn table. This consists of a round base of cast iron, a truncated cone in shape. This is five inches in diameter at the bottom and three and one-half inches high, the top being one and one-half inches in diameter. Into this is drilled a half-inch hole to a depth of two inches. The top or plate is usually nine inches in diameter, with a stem exactly in its center, two and one-half inches long, and turned to fit the hole in the base, machine oil being used as a lubricant. This is used largely for round work, but the solderer finds many uses for it, and it can only be considered as being second in importance to the lamp.

We will not attempt to describe the many other tools used by the silver solderer, but will simply mention a few: the universal square for laying out round work; the common square compasses; metal shears; files of many kinds, all of which are used by him, and yet we have not named by any means all of the tools he uses. Of course, not every one will have exactly the same tools, some working on a certain line will find some tools very useful, and his neighbor would have very little or no use for them. We can perhaps best get an idea of the business by briefly sketching the career of an apprentice. He is very often the son of a solderer and learns the trade from his father. He agrees with his employers to serve an apprenticeship of three years, in some factories signing a contract to that effect. The company in turn agreeing to teach him the trade and also to give him a sum of money at the end of three years. This is in addition to his wages, and while the amount varies with different factories, yet it is usually one hundred dollars.

FIRST STEPS.

The first task of the apprentice is to learn to tin solder. To do this he is given a piece of metal about five by twelve inches square. This is formed into a cylinder, the adjoining edges being scraped so their surfaces will be clean and free from oxide, and then soldered. The results of his first efforts are usually holes melted in the metal. After he has finished with his first seam, he saws or shears it open in another place, and starts again. Boys call this making bird-cages. They are often kept at this some time under some foreman much longer than necessary, but whether the time be long or short, all are glad when the period of making bird cages is over.

While this task is very monotonous, yet when once the trick of tin soldering is thoroughly mastered it is of great value to him in future years, and as far as soldering is concerned he will never again have anything to learn which presents so many difficulties. Understand, I do not mean that he has learned for the most part his trade. I refer simply to soldering. Of making up work as yet he knows nothing, and soldering is but a small part of his trade. But to be able to tin solder a seam so that the solder will lay on the seam evenly and flush through so as to leave no blow holes is no small task and a trick that many men who call themselves solderers never acquire.

Soldering bead is the boy's next task. The bead is strips of either plain or figured metal of various lengths and widths. This is also soldered with tin solder. Bead after soldering is sent to the turning room where it is run on to various bodies and returned to the sol-

dering room for soldering. Here is where the boy first finds a use for his gig. But first he must have what is called a plaster. To make this he takes a bead about one and one-half inches wide, and thirty inches long. This he solders and has run up into a ring and then fills with plaster of paris. This is moistened and poured into the ring. When this hardens it makes an excellent plate for soldering, being smooth and hard. The plaster is placed on the gig and the article to be soldered on it. The gig is made to revolve and the article centered by gently tapping, the blaze is then applied, the gig is kept revolving so the article is uniformly heated, and when sufficiently hot the flux and solder applied. This is called "spinning in the solder." So far the work has been of an easy nature, and has mainly furnished work for the boys, yet some man never get beyond this stage, and the art of making up work is something they never acquire.

SOLDERING AS AN ART.

The making of the more elaborate work, square and oval shapes, mounting or applying ornaments are tasks for the skilled workman, and here is where soldering ceases to be a trade and becomes one of the arts. Any one who visits the salesroom of any of the large manufacturers of silverware cannot help but be impressed by the beauty and variety of ware displayed varying from the prize cup standing on its mahogany base, being from three to four feet in height, often being severely plain, their beauty lying in their massiveness and harmonious lines, to the smaller articles delicately mounted with wreaths and flowers so lightly but firmly attached that one's impression is that they grew there, and are not the handiwork of man.

Just a word in regard to the metal we have been working on. Britannia metal is approximately 95 per cent. tin, $2\frac{1}{2}$ per cent. copper, and $2\frac{1}{2}$ per cent. antimony, but every metal mixer has his favorite mix, and I feel quite sure some who may read this article will say, "Oh! he can't mix metal," and I should not argue the point with him even if I had an opportunity.

The composition of the solders used are as follows:

Hard or Tin Solder:

Tin 16 parts by weight.

Copper 1 part by weight.

Soft Hard:

Tin 7 parts by weight.

Lead 5 parts by weight.

Soft:

Tin 5 parts by weight.

Lead 5 parts by weight.

Mercury, sometimes called Bismuth Solder:

Tin 5 parts by weight.

Lead 5 parts by weight.

Mercury 2 parts by weight.

Or to a soft fused soft solder add 2 parts by weight of Mercury.

Hard solder is used when it is necessary to have a seam that will not show or to solder a seam that would not stand the strain if soldered with a softer solder. It is used for instance to solder teaware bodies which are either spun or struck up in two halves and are not going to be mounted over the seam. Soft hard is principally used to solder bead on bodies, the melting point of this being next to tin, but is considerably lower. Soft solder is the most common and is the most extensively used, the finer work all being soldered with it, such as applying ornaments or mounting, the solderer would call it, soldering handles and spouts on teaware. Probably 75 per cent. of soldering is done with it.

The so-called bismuth solder contains no bismuth,

the price of the metal prohibiting its use, but it does contain mercury instead. This solder will stand but little strain and is used only where a solder of an extremely low melting point is required, such as for applying mount to leaded glass shades. The principal fluxes used are a mixture of resin and oil:

Resin2 parts by volume.

Olive oil1 part by volume.

This is boiled over a slow fire until the resin is entirely dissolved, two hours being sufficient to make six gallons. This flux is used for tin soldering or any place where it is desirable to use a flux free from acid or water.

For soldering on brass muriatic acid is used. This is sometimes cut down with zinc and the chloride of zinc which results is used. Some factories still use a mixture of resin and oil with a little muriatic acid or zinc chloride for their fine work, but most manufacturers consider it more expensive to use it than a flux whose primary cost is greater. It stains the work and requires considerable washing to remove it. The flux or soldering fluid most generally used has the following composition:

Glycerine5 parts by volume.

Chloride of zinc.....1 part by volume.

Crude glycerine may be used which greatly reduces the cost. This does not stain the work. All solders will flow very readily with it, and a much smaller quantity is necessary than if one were to use resin and oil.

VALUABLE METALS.

Gold is generally looked on as the last word in costliness, but, as a matter of fact, there are more metals dearer than gold than there are cheaper. The number of known metals is about seventy.

Iridium, for instance, of which a big find was made the other day in Austria, is three times as expensive as gold. Gold is worth nearly \$20 an ounce. Iridium is worth some \$62, though the price will probably come down now.

Osmium is another metal much dearer than gold. It costs about \$50 an ounce. It is by far the heaviest of all known substances, being more than 22 times as heavy as water. If pennies were made of osmium it would tax one's strength to carry the change of half a dollar. This metal has the peculiar property of being able to stand without melting the most intense heat known.

Palladium, about \$40 an ounce, is just the reverse. It is quite easy to make palladium vanish in steam. Being of a white, silvery color, and untarnishable, it is used for the division marks on scales and delicate scientific instruments.—Exchange.

EXPORTS OF GERMAN MACHINE TOOLS.

In view of the increasing productive capacity of German machine-tool makers, larger foreign outlets are considered absolutely necessary, and every endeavor is to be made to induce the government to frame the new commercial treaties on lines which will assist the German machine-tool industry in their attempts to extend their hold on the export trade. During the past year the Union has carried out a census of production among its members, in order to obtain information which would demonstrate to the government the importance of the industry, and the returns show that the total number of work people employed in the manufacture of machine tools in Germany is over 80,000, and that there are in addition over 7,000 officials, while the total output is given as 225,000 tons, valued at \$53,550,000.—Exchange.

NEW MEDIUM FOR MANUFACTURING METAL TUBING

A DESCRIPTION OF A WONDERFUL INVENTION THAT PROMISES TO REVOLUTIONIZE THE METAL TUBE INDUSTRY.

By TUBAL.

Representatives of seamless tube manufacturers, the first of last month, inspected in Detroit, Mich., a new invention for the production of seamless tubes, which does away with the 100 or more distinctive operations in their production and combines all in one continuous operation without waste. The invention, if it proves successful, threatens to revolutionize the industry, in which there is now invested some \$200,000,000 in manufacturing plants.

As there is hardly a manufactured product in which metal is used that does not use steel and other metal tubing in some parts, or manner, and hardly a manufacturing plant using machinery in which the machines are not composed partly of tubing, the importance of this invention to the entire industrial world is apparent without extended explanation. It can mean nothing else than reduced prices and increased sales and profits.

The machine is so compact it occupies but three feet by twenty feet of factory space, as shown in the pictures. A double machine, producing two tubes at once can be operated by two men. The metal is fed into it at one end and the tubing comes out at the other end. Every step is automatic and radically different from anything now used—forming welding, straightening, sizing, polishing, drawing, and even cutting being per-



MARSHALL B. LLOYD.

formed by the machine without deterring the forward progress of the steel. The machine turns out the finished, polished tube at a rate of 4,000 feet a day in any size, weight, form, or length desired.

ADVANTAGES.

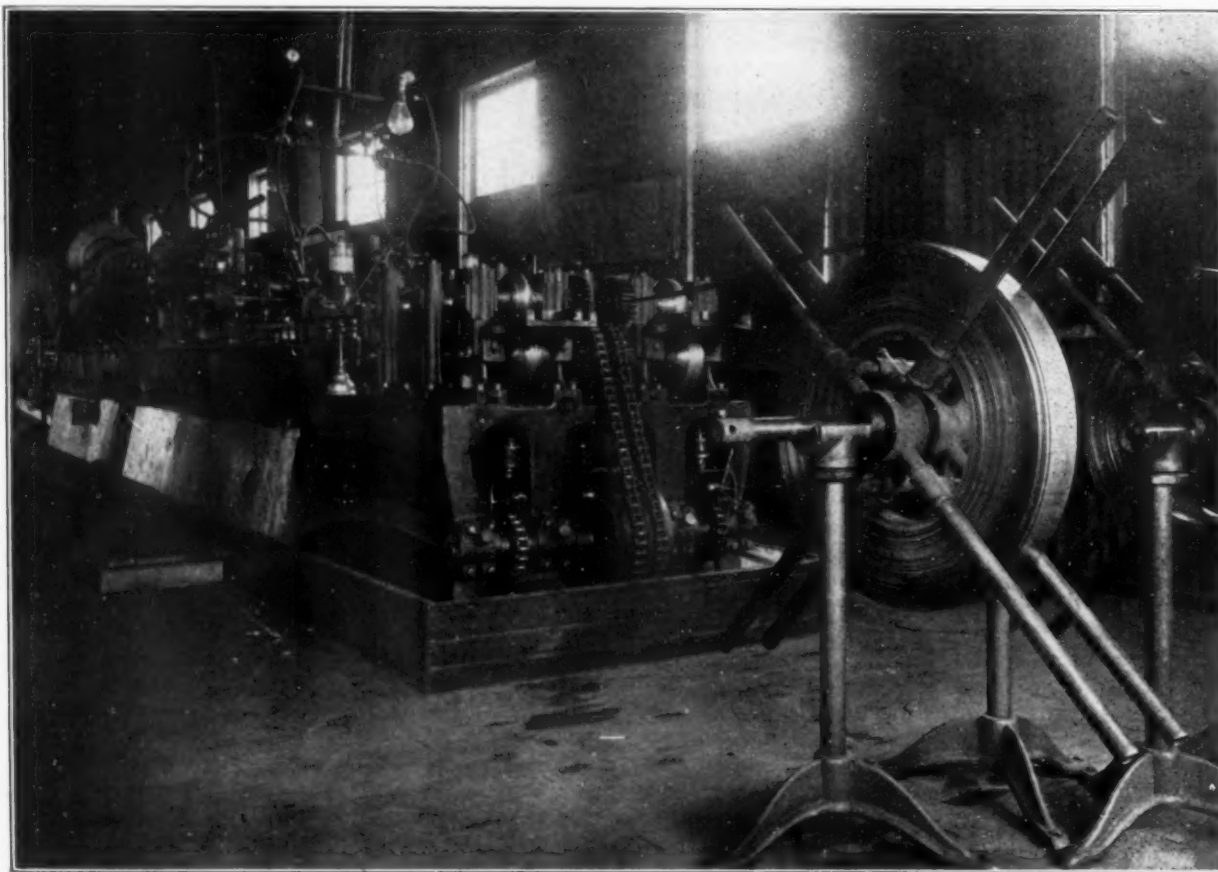
Advantages claimed for the tube produced are:

No waste. The only waste in the entire operation is 1/16 of an inch in the cutting of the tube into the desired length. Present production methods incur waste of as high as 30 per cent. in some processes.

The thinner the tube, the cheaper. This reverses the present best basis, which is based on the greater amount of labor required to draw the tubes to finer size. As the size of the automatically machined tube is determined by a simple adjustment of the machine, the material used alone regulates the cost.

Uniformity of thickness, molecular tension, and resistance are assured, a variation of only .001 to .0005 inch in thickness was recorded by the micrometer in testing the tubes made by the machine while under inspection of experts.

Irregular shapes. By ready adjustment any desired shape of tube is made; standard forms as oval, round, square, hexagon, etc., and irregular shapes, such as grooved round tubes for automobile windshields, etc.



REAR END OF LLOYD SEAMLESS METAL TUBE MILL, SHOWING SHEET METAL BEING FED IN.

No additional expense is incurred in the production of the irregular shape; no more time is required for its production.

Saving in labor. No special training in tube production is required to a double machine.

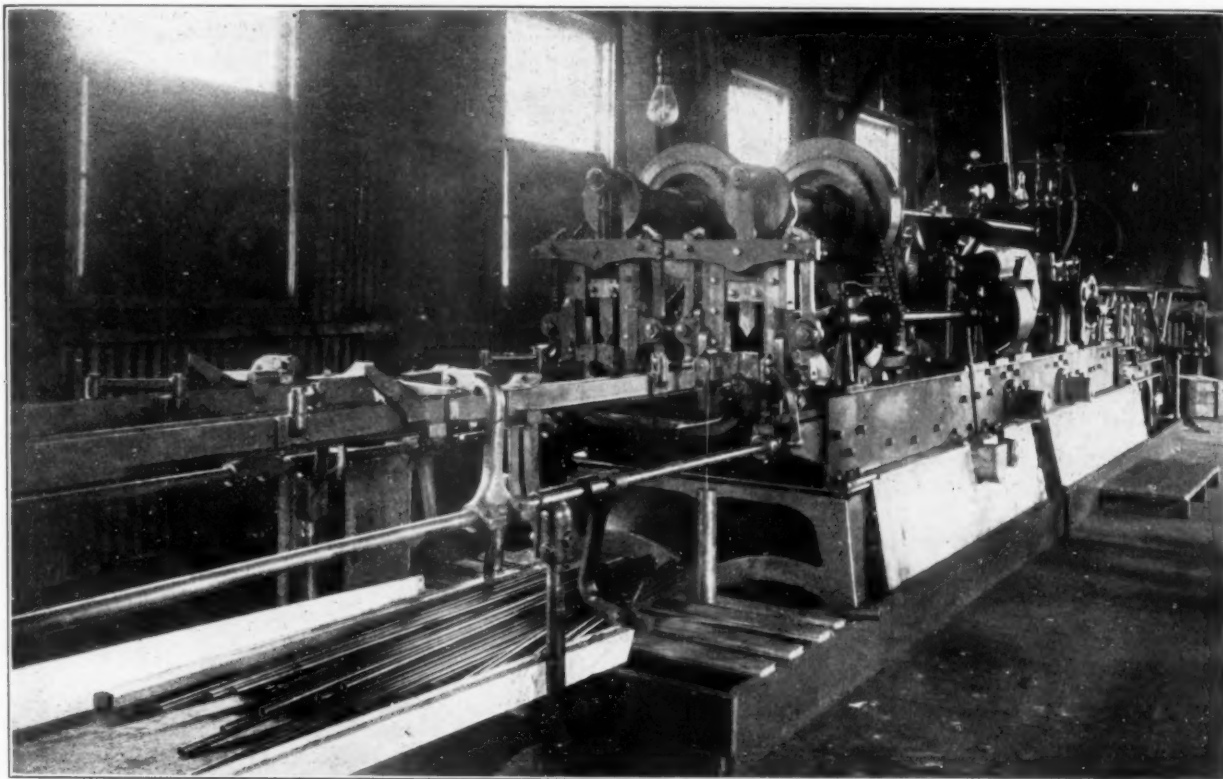
Size. Tubing from one to seven inches diameter can be turned out by the standard machine by making adjustments. Larger tubing can be produced by building a special machine.

No weak point. The method of threading the automatic tubing converts the weakest point of present tubing into the strongest point of that produced by the new invention. Instead of cutting threads into the ends of this tubing, the threading is built onto the ends of the new tubing, thus increasing its capacity to withstand pressure. In this connection, while a 10-gauge, 3½-pound pipe is tested at a water pressure of 600 pounds, the 20-gauge is tested at 3,000 pounds water pressure. Mr. Lloyd asserts that his lighter tubing

revolutionize the tube industry is 55 years old. He was born in St. Paul, but until 24 years old lived in Canada.

His attention was directed to experimenting with metal tubing some three and a half years ago. He was having great difficulty in obtaining tubing for his plant. Also, he could never bring himself to pay for light tubing more than for heavier tubing, with any degree of satisfaction. One day he chanced to observe one of his employees using an oxy-acetylene flame lamp. This directed his experiments.

Within six months there was a machine operating in his plant turning out seamless tubing in one continuous operation. It took two years more of constant experimenting before it was perfected. As soon as the machine was perfected, the patent attorney started at once to cover the invention with patents. Three are now issued on it and 49 are pending. Then, last summer, with one of the foremost patent attorneys



FRONT END OF LLOYD SEAMLESS METAL TUBE MILL, SHOWING TUBING COMING OUT FINISHED.

will stand greater pressure than the heavier grades now used.

The machine, as demonstrated, saves about 90 per cent. in labor in the production, and reduces the total cost of production by about 50 per cent. As the machine is so compact, it can readily be set up in the shop of any manufacturer using seamless tubes in his products. The company organized to market the invention announces that it will not sell its machines, but will license manufacturers to their use on a royalty basis.

Marshall B. Lloyd, president of the Lloyd Manufacturing Company, Menominee, Mich., is the inventor of the new process. Mr. Lloyd was the inventor of the woven wire fabric weaving machine, the first in the world, still in use, some fifteen years ago. A score of other inventions have made his name widely familiar in mechanical engineering circles.

The inventor of this new process which threatens to

of the country, he went abroad. They were in England and on the Continent four months, studying the process of tube making there.

OPERATION OF THE MACHINE.

Outlined in brief, the process used in the automatic production is:

The flat metal strip is drawn through a series of small rollers to form it into the tube shape with a mandrel of peculiar construction on the inside. The tube emerges from these rollers, to all appearances a seamless tube, the edges being even and tight. It then passes a device that holds the tube into position to be welded, the edges of the metal being melted by the use of gases. A small thin burr shows where the metal flowed together. This is removed with a knife and the tube is smoothed with a small emery wheel. It now passes into a large powerful vice with half round jaws, continually traveling and gripping about

two feet of the tube stock. This vice is as powerful as the ordinary draw bench, and is virtually an automatic bench in itself. When it emerges from the vice it is sized and polished by cold rolling with water. It then passes through a straightening device, without interfering with forward movement, is cut off and dropped into a receptacle on the floor. In appearance the tube appears to be nickel plated, so smooth and bright is the polish.

One of the prominent tube manufacturers who had seen this process in operation said:

"All the improvements in the history of tube making are only a trifle compared to the vast importance of what Lloyd has done. All I hope is that no one

concern will ever obtain control of it. If the inventor carries out the plan on which he proposes to operate, namely, to license everybody who wants it, present prices of tubing will be cut in half. It will do for the tube industry what the cotton gin did for cotton, and the reaper for agriculture. The saving in waste alone will mean a saving of millions a year to the tube industry."

While the machine has at present only been operated on steel tubing, Mr. Lloyd assures us that it will work equally as well on copper and brass, and he will be in a position to make demonstrations on these metals soon. The results of these experiments will be eagerly watched for by the manufacturers.

THE MICRO-CHEMISTRY OF CORROSION*

PART I.—SOME COPPER-ZINC ALLOYS.

By CECIL H. DESCH, D.Sc., Ph.D., AND SAMUEL WHYTE.†

The object of this investigation is to throw some additional light on the mechanism of the process of corrosion. Owing to the lack of homogeneity of most technical alloys, laboratory experiments fail to give much useful information as to their relative powers of resistance to corrosion, and this problem can only be attacked by carefully planned experiments on a large scale, such as those undertaken by the Corrosion Committee of this Institute. There remain, however, many subsidiary problems which may with advantage be investigated in the laboratory, using small specimens of alloys prepared from purified materials, and the results of such investigations may pave the way for comparative experiments on a technical scale.

While much work has been done on the chemical mechanism of the corrosion process, and on the electrolytic conditions, it does not appear that other physical factors which are involved have received adequate attention. These factors include the loosening of structure produced by the preferential solution of one micrographic constituent in alloys consisting of more than one solid phase; exfoliation; the formation of protective layers, either of residual metal or of precipitated basic salts or oxides; and the influence of crystalline boundaries in homogeneous alloys.

Experiments bearing on some of these points have been undertaken in this laboratory, attention being directed, after a number of preliminary tests had been made, to certain alloys of copper and zinc.

In alloys of the Muntz metal class, composed of two micrographic constituents, the α and β solid solutions, corrosion undoubtedly begins by the removal of zinc from the β -constituent, the α -crystals only being attacked at a later stage. For this and other reasons, the β solid solution of zinc in copper was first selected for systematic investigation, although alloys containing this constituent alone are not met with in ordinary technical practice. It is true that, as has been proved by the remarkable work of Professor Carpenter, the β -constituent of slowly-cooled alloys is not a homogeneous solid solution, but an ultra-microscopic intermixture of the α and γ phases. This fact, however, has not presented any obstacle. Prolonged annealing does not give rise to any visible segregation in the absence of an excess of the α or γ phase, and it is shown below that alloys quenched respectively above and below the

eutectoid point present quantitative differences in the rate of corrosion, but do not differ in regard to the nature of the process.

Reference must be made to the reports of Dr. Bengough to the Corrosion Committee for previous work on this subject, and in this place it will be sufficient to refer to the work of Lincoln and his collaborators.‡ In these experiments, alloys of copper and zinc were corroded in normal solutions of various salts, the loss of weight after a given time being determined, together with the composition of the "corrosion product." The latter included (a) a loose, flocculent precipitate of basic salts; (b) an adherent deposit of similar character which could be dislodged by rubbing the specimen with a rubber-tipped rod; (c) a firm, coppery deposit, which could only be removed by means of a knife, and sometimes then only imperfectly. In addition, the "corrosion product" must have included (d) any crystals removed by exfoliation without being dissolved. It is not clear whether the small quantity of metal in solution (e) in the electrolyte was included in the analysis or not. It is thus evident that the product analysed was the sum of several distinct substances, and that any differences between the relative proportions of (a), (b), (c), and (d) in different cases would be obliterated by the experimental method adopted. We have found that such differences actually exist, and exert an important influence on the course of corrosion.

In consideration of these, and other results obtained elsewhere, it was decided to adopt the electrolytic method of corrosion, but to distinguish carefully between the products (a) to (e) above, and to supplement the chemical analyses by a microscopical examination. Objections may be raised to the use of an electric current in bringing about corrosion, on the ground that it does not correspond with the conditions generally met with in practice. A purely chemical method, however, does not appear to be practicable in laboratory experiments on a small scale. Corrosion under such circumstances is extremely slow and subject to irregular and unaccountable variations, whilst accelerated tests, using acid or ammonia, are known to give results which are often misleading. Corrosion with the aid of an applied electromotive force is under complete control and eliminates accidental differences, so that similar conditions may be reproduced time after time with different specimens. In view of the fact that all chemical corrosion is ultimately electrolytic in character, it seems probable that conclusions reached as the result of such experiments may prove useful in the discussion of the conditions of technical practice.

*Paper read at Institute of Metals Autumn Meeting, Ghent Belgium, August 28-29, 1913.

†Respectively Graham Young lecturer and assistant in metallurgical chemistry in the University of Glasgow.

‡A. T. Lincoln, D. Klein and P. E. Howe, *Journal of Physical Chemistry*, 1907, vol. xi. p. 501; A. T. Lincoln and G. C. Bartells, *ibid.*, 1908, vol. xii. p. 550.

So far, the investigation has been confined to β -alloys of copper and zinc (slowly cooled and also quenched from above the temperature of transformation) and to alloys containing small quantities of tin and iron respectively. Experiments dealing with the influence of lead, aluminium, and nickel are in progress.

EXPERIMENTAL METHOD.

The alloys were prepared from cathode copper and Kahlbaum's zinc, melted and mixed in the usual way in salamander crucibles, using a protecting layer of borax. They were cast in warm iron ingot molds, after stirring with a carbon rod, and allowed to cool under the layer of borax. The small ingots thus obtained were sawn through and examined microscopically, and a portion taken for analysis. The specimens for the corrosion tests were cut from the ingot transversely, and reduced in size so as to give one surface exactly 12.5 millimetres square, which was ground on emery-paper in the usual way, finishing with Dujardin's 05 paper. For most of the experiments, polishing was found to be unnecessary, and the surface obtained after grinding on this fine emery was adopted as a standard.

The electrolyte employed throughout was a 5 per cent. solution of sodium chloride, of which 1 cubic centimetre was used for each of the short-period tests, and 100 cubic centimetres for each of the continued tests. In order to carry out an experiment, a specimen prepared as above was placed horizontally with the ground surface uppermost, the lower surface resting on a copper spiral connected with one pole of the battery. A vertical wall of plasticine or paraffin wax was then built up round the specimen, forming a rectangular cell to retain the electrolyte. The specimen was made the anode, the cathode being a loop of platinum wire, placed horizontally just beneath the surface of the liquid. The current was obtained from two dry cells, giving an electromotive force of 3 volts. No gas was given off at the surface of the specimen, and the deposit was therefore not disturbed during its formation. After the lapse of a definite time, usually five minutes, the cathode was removed, the contents of the electrolytic cell washed out into a beaker for analysis, and the wall of plasticine or paraffin wax removed. The solution always contained a flocculent precipitate in suspension. In addition to this, there was frequently, as noted below, a more or less adherent deposit of basic salts on the surface of the metal. This was removed by means of a jet from a wash-bottle and separately analyzed. The surface of the metal was then dried and examined microscopically. Finally, the coppery layer was removed for analysis, and the underlying yellow surface exposed for microscopical examination. In most cases, the coppery layer could be loosened at one edge by means of a knife, and peeled off without injury to the specimen, but occasionally rubbing with an edge of soft wood was necessary.

The alloys containing tin and iron respectively were prepared as above, with the addition of the required quantity of Kahlbaum's pure tin or of electrolytic iron prepared by the Langbein-Pfannhauser process.

ANALYTICAL METHODS.*

Owing to the small scale of the experiments, it was necessary to devise certain modifications of the ordinary analytical methods for the determination of the composition of the solutions and precipitates obtained after corrosion. Under these conditions, the quantity of each metal to be estimated in one experiment was to be measured in milligrammes, and often amounted only to a frac-

tion of a milligramme. It was also desirable that the methods employed should be rapid, and should avoid tedious separations. After a number of preliminary tests, the following methods were adopted and employed throughout:

Copper.—(a) In quantities less than 0.1 milligramme. Addition of H_2S water to the slightly acid solution, and comparison with the coloration given by a standard solution of copper.

(b) In quantities greater than 0.1 milligramme. Addition of ammonia and colorimetric comparison with the standard.

The standard solution is prepared by dissolving electrolytic copper in nitric acid and evaporating with hydrochloric acid until nearly all the acid has been expelled. 1 cubic centimetre = 0.1 milligramme copper.

If iron be present, the hydroxide must be removed by filtration before comparing the blue ammoniacal solutions.

Zinc.—(a) In quantities less than 0.1 milligramme, copper being present. The solution is made slightly ammoniacal, and 1 cubic centimetre of a 10 per cent. solution of potassium ferrocyanide is added. The tube is then plunged into hot water, when the precipitate which is formed at first redissolves, yielding a solution the color of which inclines to green with large proportions of zinc and to red when the copper is in excess. The color is then compared with that of two or three blanks, containing the same quantity of copper as the solution under examination (this having been determined previously), but to which varying quantities of zinc have been added. The true proportion of zinc is readily found by interpolation. This method has proved to be very satisfactory in practice.

The standard solution of zinc is prepared by dissolving pure zinc in hydrochloric acid, and removing the excess of acid by evaporation. 1 cubic centimetre = 0.1 milligramme zinc.

(b) In quantities greater than 0.1 milligramme. Copper and tin (if present) are removed by means of hydrogen sulphide, and iron by ammonia. The filtrate is evaporated to dryness and the residue dissolved in a little water; 5 cubic centimetres of concentrated hydrochloric acid are then added, and the hot solution is titrated in the usual manner with a standard solution of potassium ferrocyanide, 1 cubic centimetre of which corresponds with 0.1 milligramme of zinc. A freshly-prepared solution of uranium acetate is used as the indicator. If the quantity of zinc to be estimated exceeds 2 milligrammes as a drop indicator is employed in the usual way, but with smaller quantities of zinc greater accuracy is obtained by adding the indicator to the zinc solution and titrating until a permanent brown coloration appears.

Tin.—Copper and tin are precipitated together as sulphides, and the precipitate is collected on a filter and washed. The two metals are then separated by digestion with a warm solution of sodium hydroxide, and the filtered solution is very slightly acidified with hydrochloric acid. In the comparison tube is a solution of hydrogen sulphide, to which is added, drop by drop, a standard solution of stannous chloride, prepared from pure tin, of which 1 cubic centimetre = 0.1 milligramme tin. The yellow colorations are then compared.

Iron.—This is estimated colorimetrically in the usual manner with potassium thiocyanate, the standard solution being one of which 1 cubic centimetre = 0.1 milligramme iron.

The smallest quantities which can be determined with accuracy by the above methods are:

*These methods were worked out by Mr. Whyte.

	Milligramme.
Copper (sulphide).....	0.01
Copper (ammonia).....	0.1
Zinc (colorimetric).....	0.025
Zinc (volumetric).....	0.05
Tin.....	0.01
Iron.....	0.005

RECORD OF EXPERIMENTS.

In the final series of experiments, three alloys were used, one of which was examined in the slowly cooled and also in the quenched condition. The analyses are given in Table I. The analyses were made by the ordinary methods, copper being estimated electrolytically, and also by the iodine method, identical results being obtained. The figures in the last two columns give the composition of the equivalent copper-zinc alloys, determined by Guillet's method,* the coefficients of equivalence of tin and iron being taken as 2 and 0.9 respectively.

TABLE I.

Alloys	"Fictitious Values," by Guillet's formula.					
	Copper. Per Cent.	Zinc. Per Cent.	Tin. Per Cent.	Iron. Per Cent.	Copper. Per Cent.	Zinc. Per Cent.
I. and II.	52.95	47.05	....	....	52.95	47.05
III.	53.58	45.26	1.16	....	52.97	47.03
IV.	53.24	45.71	....	1.05	53.25	46.75

The "fictitious values" for zinc and copper represent the composition of the pure copper-zinc alloy which would correspond most closely with the actual ternary alloy. It will be seen that the alloys used are closely comparable from this point of view.

In the first series of experiments, the application of the current was continued for five minutes, the products being analyzed immediately afterwards. Alloys I. and II. contain copper and zinc only, I. being slowly cooled and II. quenched from 750 degs. in ice and water, whilst III. and IV. contain added tin and iron respectively. The results of these tests are shown in Tables II., III., and IV. By "precipitate" is meant the flocculent precipitate of basic salts which appears in the electrolyte, and is readily separated from the specimen, whilst "adherent layer" denotes the metallic deposit† which remains attached to the specimen and is renewed by flaking. The number of milli-

grammes of each metal in the respective products is shown, and the results are also expressed in percentages, in order to bring out more clearly the ratio of copper to zinc, and the proportion of third metal, if any. Each experiment was performed in duplicate.

Any metal which remained in solution in the electrolyte has been included in the precipitate. A few special tests showed that the quantity was in general very small, and no useful purpose would have been served by keeping these two fractions apart. As an example, an analysis of the electrolyte after a 45-minute test of Alloy I. may be given:

	Copper. Per Cent.	Zinc. Per Cent.	Total. Milligrammes.
In solution.....	0.01	0.67	0.68
Precipitated	0.75	24.60	25.35

TABLE IV.—Total Corrosion Product.

Alloy I.....	5.42 and 5.57	milligrammes
" II.....	4.83 " 4.655	"
" III.....	5.18 " 4.99	"
" IV.....	6.54 " 6.29	"

In the case of Alloy I., a further experiment was performed, in which, after corroding in the usual manner for five minutes, the electrolyte was decanted and replaced by fresh solution, the adherent metallic layer remaining undisturbed. This was repeated, there being in all six periods of five minutes each. The results, collected in Table V, show a progressive increase in the proper content of the precipitate.

TABLE V.—Composition of Precipitate from Alloy I.

	Milligrammes.			Per Cent.	
	Copper.	Zinc.	Total.	Copper.	Zinc.
1st period.....	0.07	2.85	2.92	2.4	97.6
2nd ".....	0.07	2.85	2.92	2.4	97.6
3rd ".....	0.15	2.82	2.97	5.1	94.9
4th ".....	0.20	2.82	3.02	6.6	93.4
5th ".....	0.32	2.72	3.04	10.5	89.5
6th ".....	0.50	2.70	3.20	15.6	84.4

On the other hand, when the same electrolyte was allowed to remain in contact with the specimen, the connection with the battery being maintained, corrosion soon came to a standstill. A new series of experiments was therefore undertaken, in which the settling of the precipitate of basic salts was prevented, and fresh electrolyte

TABLE II.—Composition of Precipitate.

Alloy.	Milligrammes.					Per Cent.			
	Copper.	Zinc.	Tin.	Iron.	Total.	Copper.	Zinc.	Tin.	Iron.
I.	0.07	2.85	....	....	2.92	2.4	97.6	....	....
	0.07	3.00	....	....	3.07	2.3	97.7	....	....
II.	0.08	2.20	....	....	2.28	3.5	96.5	....	....
	0.065	2.40	....	....	2.465	2.6	97.4	....	....
III.	0.90	2.40	0.02	....	3.32	27.1	72.3	0.6	....
	0.55	1.80	0.02	....	2.37	23.3	75.9	0.8	....
IV.	0.35	3.45	....	0.03	3.83	9.1	90.1	....	0.8
	0.35	3.30	....	0.03	3.68	9.5	89.7	....	0.8

TABLE III.—Composition of Adherent Layer.

Alloy.	Milligrammes.					Per Cent.			
	Copper.	Zinc.	Tin.	Iron.	Total.	Copper.	Zinc.	Tin.	Iron.
I.	1.90	0.60	....	....	2.50	76.0	24.0	....	....
	1.90	0.60	....	....	2.50	76.0	24.0	....	....
II.	2.32	0.23	....	....	2.55	91.0	9.0	....	....
	2.05	0.14	....	....	2.19	93.6	6.4	....	....
III.	1.40	0.40	0.06	....	1.86	75.3	21.5	3.2	....
	2.35	0.21	0.06	....	2.62	89.8	8.0	2.2	....
IV.	2.60	0.10	....	0.01	2.71	95.9	3.7	....	0.4
	2.55	0.05	....	0.01	2.61	97.7	1.9	....	0.4

*L. Guillet, *Revue de Métallurgie*, 1906, vol. iii. p. 243.

†In the case of Alloy III. this also contains a small quantity of non-metallic material.

was continually brought into contact with the surface of the alloy.

(To be continued.)

PLATING AS A SCIENCE

SOME PRACTICAL ADVICE AS TO THE FITTING UP OF A PLATING ROOM.

BY H. L. HAAS, PH. B.*

Plating is a science and should be treated as such. It is a combination of electricity and chemistry, the process being as follows: An electric current acts upon a metallic salt or combination of metallic salts splitting it up into metal and cases, the metal or metals always going to the negative pole or cathode of the electric current and the cases to the positive pole or anode. The negative pole is called the cathode and the positive pole the anode.

It is unfortunate that manufacturers of platers' supplies and platers in general do not treat plating as a science, the same as a chemist does chemistry or an electrician does electricity, for then many of the difficulties which invariably occur in plating could be obviated. The manufacturer of metal goods who plates them has only one idea in mind, namely, to plate his goods in the best possible manner and at the least cost, and he depends on the manufacturer of the supplies to furnish him the best goods for the purpose, and the plater to use them to the best advantage to accomplish these results. I regret to say that the manufacturer of the supplies does not always know the best goods for the purpose, because he does not pay any particular attention to plating as a science, and the crafty salesman has only one object in view, namely, to sell his goods irrespective of quality or science, and the poor plater, who has to use these goods and is held responsible for the results, is placed in a very unenviable position, because he has material to use that is not the best for the purpose, and his solution and plating are apt to go wrong (as he calls it).

It would be excellent if platers in general would study the subjects of chemistry and electricity, and always remember that they are dealing with a science which is both difficult and complex. If a plater knows exactly what takes place during plating and what are the best chemicals and electric current to employ for the purpose and bears in mind the one fact, namely, to have his solutions as simple as possible or nothing in them that he does not know the chemical action of the electric current upon, then, if for any reason a solution "goes wrong," he can easily remedy it, and he would be held in a more exalted position by his employer.

Nickel being the most important of the metals which are plated at the present time, I will explain what takes place in a nickel solution during electrolysis. I shall only take up one solution, namely, that made from the double sulphate of nickel and ammonia, because it is the simplest and I consider the best, although there are many others in use at the present time, all of which I consider too complicated to enable the plater to be in a position to remedy any defects which might arise not knowing their composition.

The sulphate of nickel and the sulphate of ammonia are decomposed by the electric current. Sulphuric acid and ammonia are given up at the anode or positive pole, and nickel and hydrogen at the cathode or negative pole. The nickel is deposited on the work and the hydrogen is liberated, and if the electric current is of too great an intensity or voltage, the decomposition is so rapid that some hydrogen will be taken up by the electro-deposited nickel and it becomes brittle, and the ammonia will be liberated so fast that the solution is apt to become too alkaline. So that it is necessary to have the electric current exactly of the right voltage and amperage in order to get the proper nickel deposit, and still deposit fast enough to keep the solution in proper working order.

Then, again, the nickel salts must be pure and must contain the maximum amount of metallic nickel, and the anodes must be pure and free from copper and anything that would affect the deposit. Nickel being a very difficult metal to dissolve, it takes an immense anode surface to supply the bath with enough nickel to keep up its metallic strength.

The electric current employed must be of the proper intensity or voltage to decompose the solution fast enough for the deposit to be malleable and tenacious, and yet not deposit it too slow. Hence, to have the solution work properly a moderately intense and uniform current must be employed. It has been found by practice that the best voltage to employ in nickel plating is a current of 3 volts, but all the other conditions must be correct. The connections must be made in such a manner that there is no loss of current, the solution must be proper in every detail, the anode surface must be sufficient, and if all the details are followed in a scientific manner the best results are obtained; this is always the case when plating is treated as a science.

The cables running from the dynamo to the tanks must be of the proper size to carry all the current generated, for it is a known fact that not as much electricity will flow through a small wire as a large one, the same as water flowing through a pipe; therefore in installing a plating plant have all the cables of the proper size. The dynamo should always be placed in the center of distribution of the current and not, as many do, in a corner of the plating room. Then, again, a separately excited dynamo should be used in every case where direct current is available, because it is more economical, for if you have a dynamo generating 6 volts and it takes 10 horsepower to generate it, if you are only using 3 volts it will only take 5 horsepower, while if you employ a self-excited dynamo you have to generate the 6 volts and use 10 horsepower and cut the voltage at your tanks. This is another reason of the importance of treating plating as a science.

In conclusion I would say that, if the manufacturer of plated goods will bear in mind that he wants more than a plant for doing his plating, he should insist, when he purchases his plant, that the manufacturer of the plating supplies should agree to give him a plant in every detail correct and one that will enable him to get his work out economically and also to install it in a scientific manner, and insist upon pure goods, and hold him to these points, much trouble would be avoided. I would like to see the plater held in higher estimation than he is, because he has to contend with a very complex subject and deserves much consideration, therefore I say to the plater, study and become proficient in your art and always remember that you are dealing with a science—the great science of plating. To the supply houses I would say, if you are not chemists and electricians, employ them so that you may place yourselves in a proper position to cope with the great subject of electro-platers' supplies and place the science on a basis equivalent to electricity and chemistry, never failing to treat plating as a science.

LATEST CUSTOMS RULINGS.

In overruling protests by Morimura Bros., the Board of United States General Appraisers has decided that brass plated charms were properly assessed by Collector Mitchel as jewelry and not manufactured metal.

*Chemist of The Haas Manufacturing Company, Inc., New York.



EDITORIAL



OLD SERIES.
Vol. 19. No. 10.

NEW YORK, OCTOBER, 1913.

NEW SERIES.
Vol. 11. No. 10.

THE METAL INDUSTRY

With Which are Incorporated
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

Published Monthly by
THE METAL INDUSTRY PUBLISHING COMPANY (Incorporated)

PALMER H. LANGDON	- - - - -	President and Treasurer
FREDERICK F. BURGIN	- - - - -	Vice-President
JOHN B. WOODWARD	- - - - -	Secretary

COPYRIGHT, 1913, BY THE METAL INDUSTRY PUBLISHING COMPANY

Entered February 10, 1903, at New York, N. Y., as second class matter under Act of Congress March 3, 1879

SUBSCRIPTION PRICE, \$1.00 PER YEAR, POSTPAID TO ANY PART OF THE WORLD. :: SINGLE COPIES, 10 CENTS
Please Remit by Check or Money Order: Cash Should Be Registered

ADVERTISING RATES ON APPLICATION
FORMS CLOSE THE FIRST OF THE MONTH

PALMER H. LANGDON	- - - - -	Editor and Publisher
LOUIS J. KROM	- - - - -	Managing Editor
GEORGE W. COOPER	- - - - -	Advertising Manager
THOMAS A. TRUMBOUR	- - - - -	Circulation Manager

ADDRESS ALL CORRESPONDENCE TO
THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK
TELEPHONE NUMBER, JOHN 689 CABLE ADDRESS, METALSTRY

CONTENTS

	Page.
The Chicago Convention	413
Chicago, the Convention City.....	416
The Cleaning of Steel and Iron.....	419
Automatic Machinery: Its Place in Modern Manufacturing.....	420
Brass Foundry Furnaces.....	423
Benefit of Melting Over Platinum Clips and Filings in Your Own Factory	424
Aluminum as Flux.....	425
The Art of Soldering on White Metal.....	426
New Medium for Manufacturing Metal Tubing.....	428
The Micro-Chemistry of Corrosion (Continued).....	430
Electroplating as a Science.....	433
Editorials:	
The Chicago Convention.....	434
The Tariff	434
Correspondence:	
Voltmeter vs. Ammeter.....	435
Carborundum and Alundum.....	435
Shop Problems	436
Patents	438
Equipment:	
The New Power Plant in a Canadian Brass Manufacturing Concern	440
New Brown High Resistance Electric Pyrometer.....	441
No. 3 Horn Press.....	442
New Tube Rolling Machine.....	442
Two New Molding Machines.....	443
Polishing Machine	443
Seamless Copper Coils	444
Ten Tons of Bronze Castings.....	444
Monel Metal Window Screening.....	444
Evolution in Polishing.....	444
Associations and Societies.....	445
Personals	446
Trade News	446
Metal Market Review.....	454
Metal Prices	455

THE TARIFF

With the passing of the Underwood Tariff bill last week by both houses of the National Legislature and its prompt signing by President Wilson what was considered practically impossible by politicians and laymen has been accomplished: the revising of the tariff in a downward direction and most substantially too. The New York Times of September 30 said:

Moreover, in its passage through the House and Senate, a phenomenon not witnessed before in over half a century, before the civil war era and after the high and mounting tariffs, has taken place, a thing considered impossible six months ago by the closest observers and friends of the proposed measure. The Senate has actually reduced, many times substantially, the rates of the bill as it came from the House, and the Conference Committee has resisted the upward pressure in the majority of the bitterly contested schedules. Both these facts are without precedent in modern tariff history.

The act of 1894 (the so-called "Wilson bill"), which started with a fair promise of reduction in the House, was distorted by heavy advances in the Senate and conference to such an extent that President Cleveland denounced it as an act of "party perfidy and dishonor." It was saved from a veto solely by reason of its free wool provision and its beginnings in the direction of "free raw materials."

No such danger confronts the good name of the Underwood tariff. It will be signed with commendation and full adoption by President Wilson. Apart from its fulfillment of party pledges, there is another, but connected reason for this. No bill in tariff history in the United States has ever felt, in its formative stages, so strongly the impress of the hand and influence of the executive.

The "Wilson bill" escaped in the Senate from the influence of the president; the "Dingley bill" of 1897 was the product of Congress unrestrained in an upward direction; the "Payne bill" of 1909 was substantially formed beyond the control of President Taft. He waited too long, and really influenced only a few schedules against which violent agitations had been started in the country.

We publish in another part of this issue of THE METAL INDUSTRY a list of the articles in most common use by the metal industry and a perusal of these will show the old and new rate and the reduction on the various articles. Perhaps the greatest reductions are shown in Schedule C in metals and manufactures of metals. Here we find lead, as was expected, heading the list with a reduction of 69.23 per cent. This is followed by aluminum crude, 39.61 per cent., and plates and bars, 37.66 per cent.; antimony regulus, 17.38 per cent.; German silver not manufactured, 10 per cent.; nickel sheets or strips, 15 per cent., and so on down the list. Schedule A, which includes chemicals, oils and paints, should please the plater and metal finisher, as it will probably result in a

reduction in price for the chemicals used in these branches of industry.

Taking the bill as a whole, it is practically impossible to tell what the effect on business either future or immediate will be. We can only read the letters from our correspondents in various trade centers, as published in *TRADE NEWS* in this issue of *THE METAL INDUSTRY* and draw the conclusion, from most of them at least, that either business houses are indifferent or consider themselves competent to cope with new conditions. We believe they are and that the country is in fine shape to wage any commercial battle with other countries that may be necessary to maintain our national prestige in manufactures, but what the ultimate outcome will be time only will tell.

THE CHICAGO CONVENTION

In this issue of *THE METAL INDUSTRY* we publish the latest information obtainable relating to the exhibition of foundry supplies and apparatus and the convention of four foundry and metal societies to be held in Chicago, Ill., October 10 to 17th. The last committee meeting has been held, the final arrangements as to program have been made and though we have not been able to get the details up to going to press the visitor can be sure that nothing has been overlooked to make his stay in Chicago enjoyable and profitable. Mr. Manufacturer and foundry man, it is up to you. Pack your grip and go to Chicago where you will meet five or six thousand other people all interested in what the 1913 Exhibition and Convention has to offer.



VOLTMETERS VS. AMMETERS

To the Editor of *THE METAL INDUSTRY*:

In regard to "Voltammeters"* request for more light, I must apologize to *THE METAL INDUSTRY* and its readers for the blunder I made in the article referred to; as the article should read:

1.4 volts, 1.4 ampere, with 1 anode; 1 volt, 1.5 ampere, with 2 anodes; 1 volt 1 ampere, with 1 anode. And I plated them with 2 anodes.

As I got the number of anodes with the wrong figures, I was very badly mixed up and thank "Voltammeter" very much for that part, although it does not change my contention that one volt is obtainable in different ways and with quite a difference in the current flowing, and consequently the metal deposited in a given time, which is quite a serious matter with silver.

Now, Mr. "Voltammeter," please avoid the sarcasm and give some everyday practical reasons why you differ with me and I will answer in the same good spirit, as I am after information and not fight, and my "sticktoitiveness" will get it for me.

H. J. TER DOEST.

Akron, Ohio, Sept. 20, 1913.

**THE METAL INDUSTRY*, September, 1913.

CARBORUNDUM AND ALUNDUM

TO THE EDITOR OF *THE METAL INDUSTRY*:

In the June issue of *THE METAL INDUSTRY* I read an article by S. A. Cochell in which he wants to know of the success polishers have had in using carborundum and alundum grits in polishing. Some time ago I was employed in a factory where we had some samples of alundum sent for trial, Nos. 90, 120 and 150. It was used on half hard canvas and also felt wheels and we found it better than emery, of which we used Naxos, which is supposed to be the very best. We also used Milligan and Higgins ground glue and had no trouble with it flaking or breaking off the wheel. After cleaning wheel we gave it a coat of glue to size and after drying two coats of glue and alundum. We could do from 50 to 75 per cent. more work on the wheel. The glue was prepared and used the same as we always had for emery. This was continued until we had used all of the 90 and 120, but having a lot of emery on hand, the firm did not get any more alundum. We also found Milligan and Higgins glue better than any other, and it is more economical.

H. J. LACHEMAN.

Camden, N. J., September 9, 1913.

METALLURGICAL ABSTRACT

GALVANO-BRONZES.

Die Elektrochemische Zeitschrift publishes an article on the manufacture of galvano-bronzes, that is, non-metallic objects covered with an electrolytic deposit of copper. The base used in the author's experiments was plaster. The molded object is thoroughly dried and soaked in a bath of melted mineral wax until impregnated. The completion of this step can be easily told by the fact that air bubbles are no longer given off by the plaster. The article is then allowed to drain and cool. For large pieces the wax may be diluted one-half with rosin, and the wax in any case need not be of the most highly refined white grade. Varnishing comes next and is done with a brush. The best varnish for this work is made by dissolving 25 parts by weight of gutta percha in 75 parts of chloroform and mixing with 100 parts of nitro-benzol. This forms a good coating to which the graphite will adhere. The next step is the application of the graphite, which is mixed to a thin paste with alcohol and applied

with a brush after the varnish coat is dry. The graphite coat is rubbed up lightly with a polishing brush. As the rotary brush does not reach well into the deeper indentations, the subsequent adhesion of the electrolytic deposit to these parts is assisted by finishing them with a coat of pure copper powder mixed with the varnish described above.

For the copper plating great care must be taken to avoid any grease or dust on the article or any air bubbles in its crevices or indentations. To avoid the latter, the article may be dipped first in a bath of copper sulphate to which a few per cent. of alcohol has been added, and gone over lightly with a soft hand brush. To avoid discoloration or sponginess of the deposit it is recommended to add a small proportion of formic acid or alcohol to the electrolyte. The plating is done in the same way as on a metallic base. For methods of coloring and finishing the plated article the reader is referred to standard works on the subject, Buchner's *Metallfarbung* being recommended.—C. P. K.



Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO
SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS
THE METAL INDUSTRY.



THE METAL INDUSTRY has had so many inquiries in reference to shop problems that have been previously published that it is deemed advisable in future to number each question. Since the inception of the department of Shop Problems 1,867 questions and answers have been published, without taking account of the many answered direct and by mail.—Ed.

ALLOYING

1,868.

Q.—Can you give us a formula for mixing silver bronze?
A.—Silver bronze contains the following:

Copper	67.50
Manganese	18.00
Zinc	13.00
Aluminum	1.50

—J. L. J.

CASTING

1,869.

Q.—Can you tell me a good facing sand to make a smooth casting and the best mixture to make the casting run up nice and sharp. Also the method adopted for fine art casting.

A.—Such castings as you desire are made by preparing the sand as follows: The sand used in this country is No. 0 Albany, for facing one-third Windsor Lock dried and pulverized and put through a No. 60 sieve and two-thirds of the Albany tub sand, mixing the two thoroughly together and roll and then put the whole through a No. 24 sieve and temper with water in which a handful of salt has been dissolved. For double facing or print use Windsor Lock thoroughly dried and shaken through a heavy cotton flannel bag. Re-ram the mold and skin dry.

For the finest quality of sand castings use the following mixture:

Statuary Bronze.		Needle Bronze.	
Copper	90 parts	Copper	84 parts
Tin	7 "	Tin	8 "
Zinc	2½ "	Zinc	6 "
Lead	½ "	Lead	2 "

—W. J. R.

DEPOSITING

1,870.

Q.—Kindly let me know how silver is deposited upon wood.

A.—There are several methods in vogue for preparing wooden surfaces with a metallic surface so that they can afterwards be silver-plated. They are as follows:

First—Dissolve nitrate of silver in alcohol to saturation, then apply to the varnished wooden surface with a camel's hair pencil brush; then place for a short time in an air-tight box or small room in which is placed iron pyrites covered partly with dilute sulphuric acid and water. This develops sulphuretted hydrogen and precipitates metallic silver upon the coated wooden surface that may be silver-plated in the regular manner.

Second—Prepare an alcoholic orange shellac solution and add a small amount of Venice turpentine so that the shellac dries slowly. When still tacky apply plater's fine copper bronze powder to the shellac surface with a camel's hair brush, and when dry silver-plate in the regular manner.—C. H. P.

DIPPING

1,871.

Q.—Can you tell me how to make a yellow bronze solution?

A.—We presume you refer to an acid dip for dipping yellow bronze castings or sheet metal goods. To prepare such a dip use the following proportions:

Yellow aqua fortis—38 per cent.....	1 gallon
Oil of vitriol—66 per cent.....	½ "
Water	1 pint
Muriatic acid	½ ounce

Mix in the order mentioned and allow the mixture to cool. Cleanse the articles in the usual manner by potashing; then immerse in the dip for a moment, wash well and dry out by the aid of boiling water to which is added a small amount of plater's soap and then dry in maple sawdust. If a good lustre is required give one dip then wash in water, immerse in potash for a second, then allow to cool and plunge in and out of the dip as quickly as possible and wash and dry out as previously mentioned.—C. H. P.

ENAMELING

1,872.

Q.—How do jewelers put enamel on buttons, badges, pins, etc.?

A.—The method pursued in enameling jewelry, badges, pins, etc., is as follows: The enamel is first prepared by melting together crystal glass, borax and metallic oxides. For instance, a transparent red should consist of the following: Purple of Cassius, 65 parts by weight; crystal glass, 30 parts; borax, 4 parts. This mixture is heated to 2,000 degrees in a crucible; after melting it is poured into water to produce a granular enamel; is afterwards dried and then pulverized to a powder and mixed with water and applied to the surface of the article (previously cleansed), to be enameled with a steel tool or spatula.

The enamel is allowed to dry and then they are heated in quantities in a furnace by the aid of bunsen flames until the enamel is remelted and flows evenly over the surface of the article. When cool the excess of the enamel is polished from the surface of the articles to show the intersecting gold or silver and then polished or burnished in the regular manner.—C. H. P.

ETCHING

1,873.

Q.—Can you give us some information concerning a sort of slush or putty that is made to bring up sharp, the fine chased details in steel dies used for stamping Britannia metal ware, etc.?

A.—There is no material such as mentioned that we know of that would bring up the lines finer in the chased detail work of steel dies other than an etching fluid.

Such a fluid that is highly recommended consists of the following:

Iodine	4 parts
Potassium Iodide	10 parts
Water	80 parts

If the die is perfectly free from oil or grease an application of the above with a camel's hair brush will bite the steel and in all probability produce finer lines. It would be well to experiment upon an old die first.—C. H. P.

FINISHING

1,874.

Q.—Can you give a formula for the blue steel finish on brass, to imitate the enclosed sample. The sample enclosed is steel, but we want to imitate this color, using brass?

A.—You evidently refer to the bright or cut steel finish in-

stead of a blue steel finish as stated. You can imitate the steel finish upon brass as follows: Polish the surface of your buckles by the regular method of barrel burnishing, which would give the best imitation of the surface, using steel balls for the purpose. Now prepare a concentrated solution of white arsenic in muriatic acid; add as much of the arsenic that the acid will absorb by the aid of heat. Add sufficient acid and arsenic mixture to a regular nickel solution to give the steel tone, one or two ounces to the gallon. The nickel solution should be maintained especially for the purpose, as it cannot be used for regular nickeling again. Dissolve the arsenic in the acid beneath a strong draught, as the fumes are very strong.—C. H. P.

GILDING

1,875.

Q.—Can a piece of carbon be used with a gold anode to make it work quicker?

A.—To increase the anode surface in connection with gold flat pieces of carbon may be used if so desired.—C. H. P.

MELTING

1,876.

Q.—What is the best cover for molten metal in the Schwartz furnace?

A.—The best cover for molten metal in the Schwartz furnace is one part of fluor-spar and three of lime. A few shovels of hard coal should be added from time to time.—J. L. J.

1,877.

Q.—What are the approximate melting points of the following alloys: Ferro-manganese (manganese 80 per cent.) and ferro-vanadium (vanadium 25 to 30 per cent.)?

A.—Melting point of 80 per cent. ferro-manganese.—The most reliable data on the above is that obtained by Dr. R. Woldenke and published in a paper on "The Melting Point of Cast Iron," which was read before the Pittsburgh Foundrymen's Association October 24, 1898. The ferro-manganese had the following compositions:

Carbon	5.02
Silicon	1.65
Manganese	81.40

A melting point of 2,255 degs. F. was found by Dr. Woldenke.

Melting point of ferro-vanadium.—The melting point of this material as made by the American Vanadium Company is between 1,340 and 1,400 degs. C., depending on the content of vanadium, the average product of this company running between 30 and 36 per cent. The highest melting point is attained with an alloy of 40 per cent vanadium, which melts at 1,500 degs. C.—J. L. J.

OXIDIZING

1,878.

Q.—Please give me a formula for a platinum oxide suitable for sterling silver flatware and medals.

A.—Dissolve chloride of platinum in denatured alcohol and add a very small amount of sulphate of copper and sulphate of iron, previously dissolved in a little boiling water. Apply the platinum oxidize with a very soft brush and heat the articles over a bunsen flame. The articles will immediately turn black.

Care should be used not to add too much copper or the black may appear brownish in time.—C. H. P.

1,879.

Q.—Is there any formula you know of other than the platinum and iron for the oxidizing of silverware and which is not so expensive?

A.—The only solution that can be used satisfactory for oxidizing other than platinum is sulphuret of potassium or hydro sulphuret of ammonia. To obtain the best results from these chemicals prepare a concentrated solution of the sulphuret of potassium in boiling water and keep in a stoppered bottle to exclude

the air. Paint the surface of the plated or silver articles with the mixture, using a soft brush, then heat over a bunsen flame. The surface will immediately turn black.

The hydrosulphuret of ammonia can be used in its concentrated form without diluting with water in the same manner.—C. H. P.

PLATING

1,880.

Q.—We are copper plating steel articles in a cyanide bath which is used cold, but we get an uneven deposit. We have added bisulphate of soda, but that makes no difference; also the anodes remain black. Can you suggest a remedy?

A.—If you could arrange to heat your copper bath to 120 degrees Fahrenheit, you would obtain more satisfactory results and do your plating in considerably less time.

From the appearance of your anodes you have probably added too much sodium bisulphate, but if the bath was heated this excess would not make so much difference.

It is advisable to add 2 to 4 ounces of cyanide to each gallon of solution. This will clean up your anodes and brighten the color of deposit.—C. H. P.

SILVERING

1,881.

Q.—Would you kindly give me a little advice on a bright silver solution?

A.—Your trouble is due to the fact that you have not added sufficient of the bisulphide of carbon to produce the bright effect you desire upon your silver plated articles. It will take at least 10 to 20 drops of the carbon to produce a bright lustre in ten gallons of solution. We would suggest that you prepare a stock solution as follows: Fill a pint bottle three-quarters full with some of your silver solution, then add as much pulverized cyanide as it will dissolve, then add two ounces of bisulphide of carbon and two ounces of ether. Shake freely at intervals to dissolve as much of the carbon and ether as possible; at the end of twelve hours pour off all the clear solution from the undissolved carbon and ether and add one ounce of the mixture to a 100-gallon bath. This addition should be made at the close of the day's work and the solution thoroughly stirred. If the articles do not come sufficiently bright the next day, repeat the operation in the evening. Two ounces should be ample. An excess produces silver deposits of a brownish tone with bright spots upon the surface and the solution becomes discolored, so care must be used in making additions.

The addition of brimstone or sulphur is of no avail. The carbon bisulphide contains sufficient sulphide when added in the right proportions to produce bright results.—C. H. P.

SPOTTING

1,882.

Q.—We are troubled with small gray spots forming on our reflectors. Can you advise us what to do?

A.—If you examine the spots that form on your reflectors closely with a strong magnifying glass you will note a small pin hole that will appear to have considerable depth under the glass. These pin holes are what cause your trouble. The silver solution works into these minute holes under the action of the current and become occluded. The washing of the reflectors does not remove this solution because it is not accomplished in a thorough manner. The cyanide remaining absorbs added moisture, especially on very damp days, and spreads to the surface of the reflectors. The size of the spots depend upon the depth of the holes. To avoid this trouble we suggest that instead of only rinsing in cold and hot water after plating that this be done several times. The expansion and contraction of the metal under these several washings will remove the solution from the pores and avoid further trouble, but as an extra safeguard we suggest that the boiling water be slightly acidulated with cream of tartar. One-quarter to one-half ounce per gallon of water should be sufficient strength. After this immersion the reflectors should be dried in a heater raised to a temperature of 250 degs. or more.—C. H. P.

PATENTS

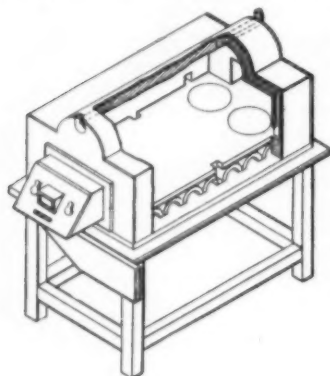
REVIEW OF CURRENT PATENTS OF INTEREST TO THE
READERS OF THE METAL INDUSTRY.

1,069,983. August 12, 1913. **Furnace.** Godfrey L. Schutz, Rochester, N. Y.

The object of this invention is to provide an improvement in furnaces, such furnaces as are used for case hardening the steel rings used for bearing surfaces in ball bearings, or for case hardening any other steel parts.

Another object of the invention is to provide a furnace, shown in cut, that will secure an even distribution of heat on the parts that are to be heated and hardened.

Another object of the invention is to provide special facilities in the furnace for exposing the parts to be case hardened uniformly to the heat from all directions.



Another object of the invention is to provide turn tables in the furnace, on which the parts to be case hardened can be rotated and exposed to the heat of the furnace.

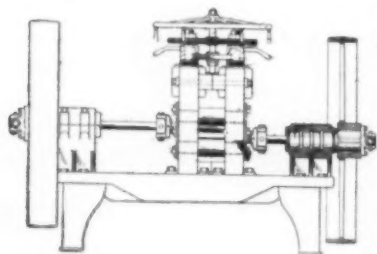
Another object of the invention is to provide a yielding floor or false bottom in the furnace on which the highly heated pieces of steel may be handled with safety and freedom from distortion or warping.

Another object of the invention is to provide a chute at the end of the furnace through

which the finished parts may conveniently pass without exposure to the air from the furnace to the water tank, where they are chilled.

1,071,846. September 2, 1913. **Rolling Mill.** Frank A. Wilmot Bridgeport, Conn.

This invention relates to rolling mills for either hot or cold rolling to reduce thickness or change sectional areas of strips and bars of metal.



It is one of the objects of the invention to provide means, as shown in cut, whereby greater uniformity of thickness of the material being reduced may be obtained, especially of materials in the thinner gauges, the commercial production of material of uniform

thickness having heretofore been practically impossible.

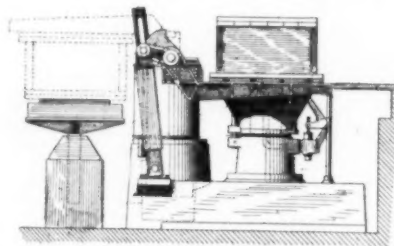
A further object of the invention is to provide a construction which will permit the rolls to be end driven, to be greatly reduced in diameter, and to be made without necks, with the result that they may be uniformly hardened, and with but little danger of cracks developing, and, owing to their reduced diameter, may be ground smooth and true at a great saving in cost and time.

A further object of the invention is to provide means for changing the position of the rolls, so that the material passing through the mill will be reduced at the center to a greater extent than at the edges, or reduced at either edge to a greater extent than at the other edge.

1,072,395. September 2, 1913. **Molding Machine.** Wilfred Lewis and J. T. Ramsden, Philadelphia, Pa. Assignors to the Tabor Manufacturing Company, Philadelphia, Pa.

The principal object of the present invention is to provide

a simple, comparatively inexpensive and reliable molding machine of the hinged variety, which shall operate by power and also as a jarring machine. Two of the 22 claims covering the machine shown in cut are as follows:



The combination of flask receiving means, a jarring table and means for actuating

it, a hinge member having a piston and cylinder for raising and lowering it and arranged between the jarring table and the flask receiving means, arms pivotally connected with the hinge member and having means for arresting them at right angles to the line of travel of said member, rearward extensions from the arms, and devices connected with the extensions for affording the hinge member a range of vertical motion without turning the arms and for turning the arms when the motion of the hinge member exceeds that limited range. A turnover and pattern drawing device for sand molding machines comprising a plate for carrying a pattern and a flask, turnover arms for engaging with said plate to raise and turn the same, and means on said turnover arms for automatically locking said plate and said arms together during the raising and turning of said plate.

1,072,414. September 9, 1913. **Refractory Material.** Walter Arthur, Schenectady, N. Y. Assignor to General Electric Company. A corporation of New York.

The present invention relates to a product useful, for example, as a heat insulating material in electric furnaces, ovens, fireless cookers, or any other purpose where a refractory, inert material of low heat conductivity is required. In accordance with this invention, a charge of silica, carbon and rutile is submitted to a temperature at which reduction takes place with the formation of vaporous products which condense in the form of flabby, fungoid-like masses, containing silicon, carbon, oxygen, titanium, and other metallic elements. The invention includes this new product which has a very low heat conductivity and low temperature coefficient.

In carrying the invention into effect, a mixture by weight of about 15 parts of silica, 20 parts of commercial rutile and 12 parts of carbon, such as crushed coke, are heated in an electric furnace, conveniently in a so-called "smothered arc" furnace with fire brick walls, the mixture being placed between and around two opposing carbon electrodes, carrying the current, and out of contact with each other. In order to condense the resulting sublimed product, a housing is preferably placed around the furnace, which housing acts as a condensing chamber. A soft, flaky, laminated material is condensed which has a considerable amount of mechanical coherence, so that it may be picked up as flabby sheets, or irregular masses. It is grayish or yellowish in color, has an apparent density of .06 to .16, a real density of about 2.56 and will withstand a temperature of about 900 degs. to 1,100 degs. C. and in some cases even a higher temperature without deterioration or fusion.

1,073,076. September 9, 1913. **Method of Treating Metals.** James A. McLarty, Toronto, Ontario, Canada.

This invention relates to treating metals; and it comprises a process of treating metals for the purpose of rendering them proof against oxidation, rusting, etc., and of converting them into a stable form wherein such metals are exposed to

the vapors generated from a heated material comprising a carbon hydrate, such as sawdust, paper, etc., a material comprising an oily carbon compound, such as crude petroleum oil, and water.

The inventor has discovered that by exposing metals to vapors generated at a comparatively low temperature from materials comprising a carbohydrate, materials comprising oily carbon compounds and water, he can produce a change in such metals which renders them of better properties for many purposes, making them proof or stable against ordinary atmospheric conditions and enhancing generally their valuable properties.

The process may be carried out in any suitable form of apparatus in which the metals can be exposed to the stated vapors for a sufficient length of time. The length of time will generally depend upon the size, shape and material treated; but for small articles the inventor finds that 4 or 5 hours' exposure are sufficient. The length of time will also depend on how far going a change in the article is desired. The temperature may vary within wide limits, but generally speaking the lower the temperature of the vapors the longer must be the period of exposure. The temperature of the material itself is never allowed to go to a red heat and is always below this point.

1,072,738. September 9, 1913. **Apparatus for Casting Metal.** Alonzo A. King, Paonia, Col.

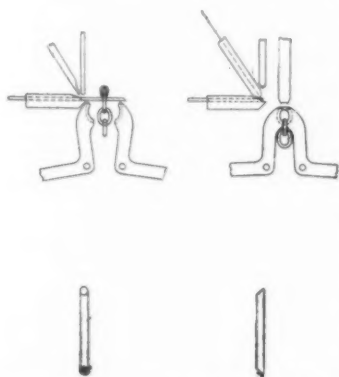
This invention relates to the method of and means for casting metal, and has for its object the provision of an improved apparatus, as shown in cut, and mode of operation, whereby the product will be more easily and quickly produced than has heretofore been possible, and, when finished, will be more complete in details than has been possible with the methods heretofore followed. The invention is applied

more particularly to the production of dental inlays, but is not confined to that field.

The invention utilizes the power of air under high pressure, flowing toward a vacuum, to force molten metal into all the crevices and against all the faces of the impression which has been prepared to receive the metal.

1,073,090. September 16, 1913. **Process for the Manufacture of Soldered Chains and Wire Tissues from Wire of Solid Cross-Section.** Theodor Bürck, of Pforzheim, Germany.

The manufacture of chains from wire of solid cross-section is well known. The usual manufacturing methods present,

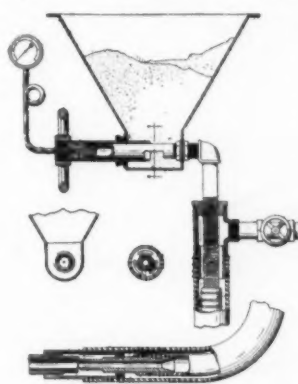


however, certain inconveniences. The soldering of the links is difficult and it often happens that, after the link is finished, the small lump of solder drops out of the joint. It has already been proposed to hollow the joint or to bore a hole into the end of the wire, the solder to be placed in the cavity which is thus formed. But even with this method of manufacture, it happens that the solder gets lost. This manufacturing method has further the inconvenience that the joint looks as if it was not tight owing to the hollowing of the ends of the wires.

The improved method, according to the invention, consists in providing at the middle of the end surface of the wire, as shown in cut, a bur behind which the strip of solder is pushed

whereupon, by means of a punch of special shape, a piece of solder of the required length is cut off the strip, the bur being at the same time pressed against the end of the wire so that it clamps in place the piece of solder which thus cannot get lost during the further manipulation.

1,073,149. September 16, 1913. **Sand-Blast Apparatus.** G. R. Lawrence Cleveland, Ohio. Assignor to the W. W. Sly Manufacturing Company.



This invention relates to sand-blast apparatus, and has for its general objects to provide an apparatus of this character, as shown in cut, that will give a steady flow or discharge of sand; that will be capable of effectively regulating the flow of air and sand through the discharge nozzle; that will be extremely convenient in operation and relatively simple and inexpensive of production. A further object of the invention is to provide an improved form and construction of nozzle and improved means whereby the flow of sand may be regulated in accordance with the grade of sand used and other varying conditions of use.

1,073,432. September 16, 1913. **Process of Preparing Electrolytes for Use in the Deposition of a Metal or Metallic Alloy.** Pascal Marino, London, England.

The object of the present invention is to facilitate the electro-chemical reduction of soluble metal salts into ions by dissociating said salts as completely as possible in order to subsequently electrolytically deposit the metal present in said salts on metallic or metallized surfaces, and to produce alloys such as those of nickel and silver or of tin and copper (bronze) by the simultaneous electrolytic deposition of the metals constituting those alloys.

The inventor says:

"This dissociation is effected by submitting the solution of the salts to the process which is constituted by three following successive steps, viz.: (a) I add to a solution of the salt or salts of the metal or metals to be deposited, an organic reducing agent which serves to effect the partial dissociation of the metallic salt or salts. (b) I then heat the solution in order to assist in the dissociation by decreasing the cohesion of the molecules and thus overcoming certain affinities irreducible at ordinary temperatures. (c) When the solution has become cold I add to it another reducing agent for the purpose of effecting dissociation to a maximum degree, that is, as far as may be without altering the fact of solution.

"As regards the organic reducing agents it is necessary to employ an organic acid combined with a fixed base in order to assure the stability of the electrolyte. As reducing agent during the first step of the process I prefer to employ magnesium boro-citrate in solution. As regards the reducing agent during the last step of the process I prefer to employ either gluco-citric or gluco-tartaric acid in the proportion of 15 per cent. of the weight of the metal salt or salts. Gluco-citric acid may be prepared by mixing together 1 molecular weight of glucose and 3 molecular weights of citric acid, and gluco-tartaric acid by mixing together 1 molecular weight of glucose and 2 molecular weights of tartaric acid."

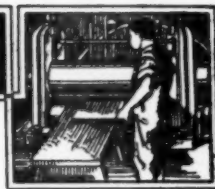
1,073,461. September 16, 1913. **Process for the Separation of Lead and Zinc.** Jules Babé, Honfleur, France.

This invention has for its object a process for the separation of the lead and zinc contained in an intimate mixture or a combination of salts or oxides of these metals. This process is based upon the following observations: When sulfureted hydrogen or an alkaline or alkaline earth sulfid is added to the mixture or the combination of salts or oxides of zinc and lead it is the lead that first of all forms a sulfid; the zinc does not combine and does not form a sulfid until the whole of the lead has been sulfureted.



EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF
INTEREST TO THE READERS OF THE METAL INDUSTRY.



THE NEW POWER PLANT IN A CANADIAN BRASS MANUFACTURING CONCERN

By P. W. BLAIR.*

The new power plant of the Canadian factory of the H. Mueller Manufacturing Company, Ltd., Sarnia, Ontario, Canada, has just been completed and went into full operation on Wednesday, July 4, the American national holiday. The power plant has been in the course of construction for the past year and is one of the most up-to-date power and equipment buildings for the manufacture of brass and iron goods in the world. For the past six months the company has been operating with a 25 horsepower gas engine, making patterns, tools and equipment.

Two Sterling water tube boilers constitute the steam generating equipment, each having a capacity of 250 horsepower and the pressure rating is 150 pounds to the square inch, although the boilers are worked at 140 pounds. The furnaces are of the Sterling design with which most engineers are familiar and they are equipped with Martin shaking grates. Steam is generated by natural gas as fuel and they are equipped with Kenilworth Gas

Steam for the engine is supplied through high pressure steam mains carried on suitable racks located in a tunnel that connects with all buildings from the power house with the low pressure lines conveying the exhaust steam for the coils in the high pressure lines in the tunnel. The steam is reduced from 140 pounds to 100 pounds, and any deficiency in exhaust is made up with live steam through a reducing valve. It is protected with a suitable strainer, so constructed that any foreign substance that

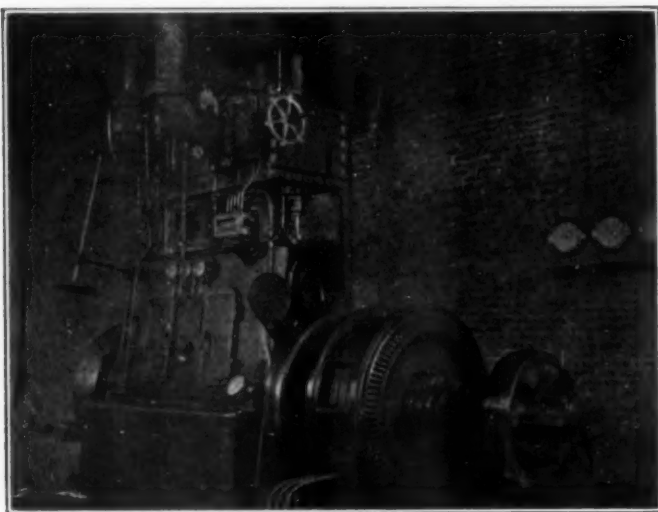


FIG. 1. ROBB VERTICAL ENGINE; 250 H. P., 450 REV. PER MINUTE.

Burners and so arranged that a change from gas to coal as fuel can be accomplished in a few minutes should it become necessary. The boiler feed pumps take water from a Cochran feed water heater and purifier at a temperature of 210 degrees and deliver it to the boilers under the control of Copes feed water regulators. The pump governor used in connection with above regulator is a product of the H. Mueller Manufacturing Company, Ltd., and will be manufactured at the company's new plant at Sarnia. Blowing down the boilers is done in a blow-off tank which overflows into a sewer, the tank having a 4-inch vent to atmosphere.

From the boilers steam is conveyed through Powell non-return valves and pipes with long radius heads to a common heater and from there to a common heater and from there to the main unit pumps, the heaters and pipe lines being provided with suitable drips which are automatically controlled by Kuly high pressure steam traps. The high pressure steam lines have the Van meter joints with rolled steel flanges where the low pressure lines have the same kind of a joint except the flanges, which are semi-steel. The heating and ventilating plants are separated into three units each, which consists of a set of coils, circulating fan and a small slide valve engine known as the Sturdevant Heating System.

*Foreman Brass Finishing Department, H. Mueller Manufacturing Company, Ltd.



FIG. 2. THE MAIN SWITCHBOARD.

lodges in body of same can be removed. The regulators and strainers are products of the company's new plant and will be manufactured and placed on the market by them at Sarnia. The steam pipes and fittings were furnished and installed by the M. W. Kellogg Company, of 50 Church street, New York, under the supervision of Mr. J. Newman. The valves used in this new and up-to-date plant are the Powell White Star and furnished by the William Powell Company, of Cincinnati, Ohio.

The generating unit consists of a Robb vertical cross compound engine, direct connected to a Canadian General Electric 480-volt, 60-cycle, 3-phase alternator, 450 r. p. m. See Fig. 1. Switchboard is of black marine slate and was furnished with instruments and switches by the Canadian Westinghouse Company, of Peterboro, Ont. See Fig. 2. Induction motors are used for power in the different departments of the plant and range in size from 3 to 25 horsepower. The power distribution system

and lighting circuits are all carried through the tunnel, being composed of lead cables of ample size and supported on racks

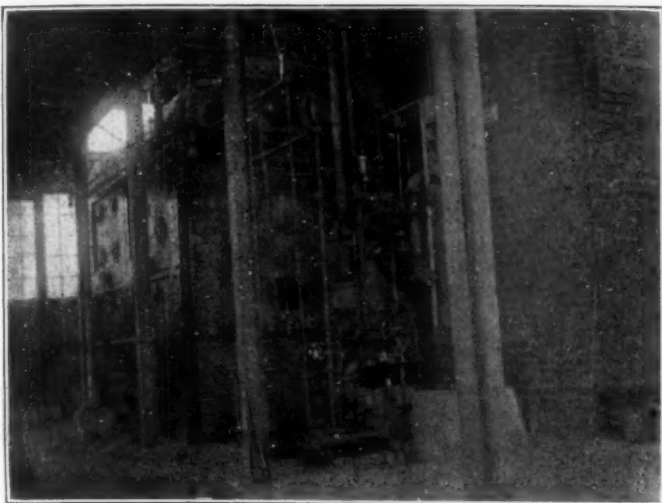


FIG. 3. VIEW OF INSIDE OF BOILER ROOM.

along the sides of the tunnel and then enter into the various buildings. Additional cables may be installed at any time as re-



FIG. 4. VIEW OF WEST SIDE OF FOUNDRY BUILDING.

quired, as ample provision has been made for same. The plant throughout has been arranged for future units, as it no doubt will



FIG. 5. NORTHEAST CORNER OF BRASS FINISHING ROOM.

be but a short time until the second unit will be installed and the generators run in synchronism.

The new foundry and finishing buildings are now running. Fig. 4 shows inside view of a corner in the foundry. They are producing on an average of one and a half tons of castings per day and will keep on increasing until it reaches its capacity. Fig. 5 shows a view of part of the finishing building which is equipped with all the latest tools and machines for the production of high grade Mueller brass goods.

NEW BROWN HIGH RESISTANCE ELECTRIC PYROMETER

For measuring the higher temperatures no form of pyrometer is so satisfactory nor so accurate as the thermo electric pyrometer, which as is generally known consists of a milli-voltmeter graduated in degrees of temperature and a thermo-couple. The desirability of having the resistance of the milli-voltmeters comparatively high has been a recognized fact, but it was not until recently that the art of instrument-making was able to overcome

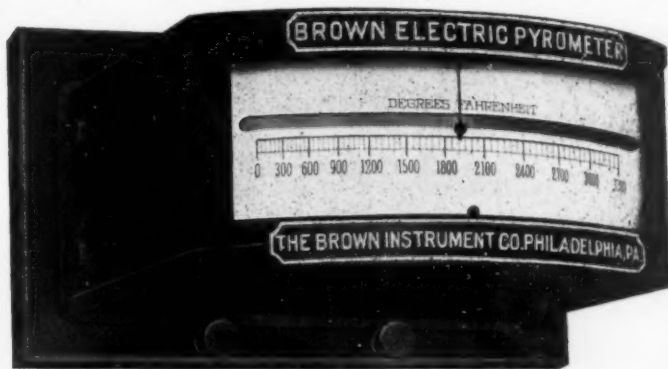


FIG. 1. THE BROWN ELECTRIC PYROMETER.

the various difficulties of design and construction and produce such a milli-voltmeter.

For this reason low resistance thermo electric pyrometers have been very generally used, the resistance of the milli-voltmeters measuring from 2 to 5 ohms. With this type of instrument it is absolutely essential for the instrument to be calibrated with the leads or connecting wires which are to be used, and any change in the length of these leads or any change in the length of the thermo-couple furnished with the instrument will alter the true indication of the pyrometer and serious errors will result. A change in the length of leads of 1 to only 50 feet is sufficient to make the average low resistance pyrometer read 25 degrees or more low, and a change in the length of thermo-couple from 3 to 4 feet will make the same instrument read 20 degrees or more in error. For fairly accurate results, therefore, it is necessary to use the thermo-couple and leads which are furnished with the instrument, or exact duplicates thereof.

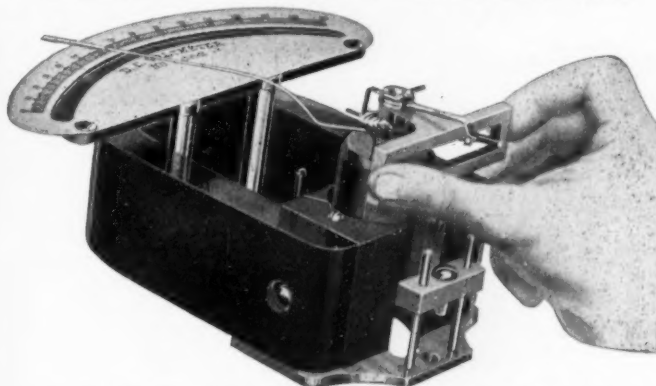


FIG. 2. SHOWING CONSTRUCTION OF BROWN PYROMETER.

The advantages, however, to be gained from a properly designed and constructed milli-voltmeter of high resistance are very marked and some of them are as follows: Any change in the length of leads connecting the thermo-couple with the milli-voltmeter from 1 to 1,000 feet will not change the indications of the instrument as much as 5 degrees; nor will any change

in the temperature of these leads introduce any error in the indications of the instrument; neither will the length of thermo-couple, the size of the elements forming the thermo-couple nor the length of the thermo-couple inserted in the heat change the indications of the instrument. All of these advantages are due entirely to the extremely high ratio of the resistance of the millivoltmeter in relation to the resistance of the thermo-couple and leads.

The Brown Instrument Company, pyrometer manufacturers, of Philadelphia, Pa., who devote their entire time and attention to the various problems connected with temperature measurements, have for the past two years been conducting exhaustive tests and experiments in order to design an accurate, high resistance, thermo-electric pyrometer. The result has been that the Brown Instrument Company is now able to supply such an instrument of the pivoted type, that is, a type in which the moving element or coil is not suspended from the end of wire or metal strip, but is absolutely supported by means of small hardened steel pivots in sapphire jewel bearings. The moving coil and pole pieces of the magnet have been so changed in design as to produce a magnetic flux of great intensity in the air gap in which the coil swings. This high resistance instrument, having a resistance of 100 ohms, can be furnished in either the indicating type or the recording type.

In Fig. 1 is shown the standard type of indicating instru-

NO. 3 HORN PRESS

The press shown in cut is claimed to be the handiest press ever designed for light metal punching. It meets all the requirements of the different and difficult classes of work encountered by the fixture, auto-lamp, aluminum ware, toy and novelty houses, etc. The horn has a die holder at both ends, and can easily be reversed. The Depth of throat is 6 inches. The stroke is adjustable from $\frac{3}{8}$ to $1\frac{1}{4}$ inches.

This press is made by the Wilcor Manufacturing Company, Chicago, Ill., who has purchased the entire plant, consisting of the machine tool equipment, stock, fixtures and right to manu-



NO. 3 HORN PRESS, MADE BY WILCOR MANUFACTURING COMPANY, CHICAGO, ILL.

facture under the patents of the late Fritz A. Schulz, builder of metal spinning lathes and accessories, who died February 22, 1913. They will further develop the already celebrated Schulz line of metal spinning lathes, rivet spinning machines, punch presses, quick action vises, etc.

The personnel of the firm is: Mr. O'Rourke, president and treasurer, who is a practical mechanic, and has been associated with metal manufacturing lines for the past thirty years. Mr.

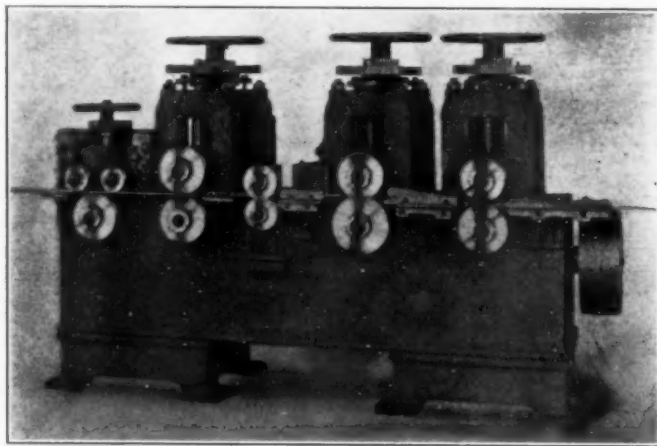
Corrigan, the general manager, is also a practical man, having managed the business for the late Fritz A. Schulz for the past six years.

ment of the high resistance type, it being customary to supply this instrument in the horizontal type, as it affords a long scale for easy reading. This type of instrument has a mirror under the scale so that absolute accuracy in readings can be secured. In Fig. 2 is shown the interior construction of the high resistance system, showing the redesigned pole pieces and small moving elements, the moving element having been lightened to a minimum. It will be understood that all the complaints heretofore experienced in pyrometers, due to the question of accuracy with a certain length of thermo-couple, or to the length of thermo-couple inserted in the heat need not be considered with this new instrument. Its accuracy is naturally far greater and wherever accurate measurements are desired an instrument of this type will be used in the future.

The Brown Instrument Company has been able to design this system in such a manner that its cost is practically no greater than the cost of manufacturing the low resistance instrument which permits them to put an instrument of this character on the market at a reasonable price. The instrument can be used for either base metal or platinum thermo-couples as desired, and it is recommended for either type of thermo-couple. The same type of system is also used in connection with the recording instrument, and it is possible now to procure Brown high resistance indicating or recording pyrometers for either platinum or base metal thermo-couples.

NEW TUBE ROLLING MACHINE

A new tube rolling machine designed to roll metal tubing from $\frac{1}{2}$ to $\frac{7}{8}$ inches in diameter has been brought out by the Etna Foundry Company, Toledo, Ohio. No. 10 gauge metal or as much lighter as is desired can be used. The tubing is rolled by passing the stock through five sets of rolls. After passing through the second set of rolls the material is shaped much like a U. Between the second and third sets the partially formed tubing passes over a mandrel. The third set is an idler set and serves as a guide. The fourth set brings the edges together and completes the circular roll. The last set at the left in the illustra-



NEW BRAZED TUBE MACHINE. ETNA FOUNDRY COMPANY.

tion are the straightening rolls. The tubing comes from the machine in a straight line ready for brazing.

The lower roll shafts are driven directly by worms on the main shaft. These lower roll shafts drive the upper roll shafts by means of spur gears. The rolls are adjusted by means of hand wheels and screws with which the upper roll shafts are moved up and down in their double housings and kept parallel to the lower roll shafts. The forming rolls are of hardened tool steel 8 inches in diameter. The main bearings and all of the roll bearings are bronze bushed. The worm bearings are solid bronze. The machine is 8 feet long, 5 feet high and 3 feet wide and weighs approximately 4,800 pounds. It is stated that it has a capacity for rolling 45 feet of tubing per minute.

TWO NEW MOLDING MACHINES

The Osborn Manufacturing Company, Cleveland, Ohio, manufacturers of molding machines, have just placed upon the market two new machines. The first of these shown in Fig. 1 is called THE OSBORN "LITTLE WONDER" MOLDING MACHINE.

The Osborn company say that if there ever was a machine deserving of its name it is this new Osborn type of roll-over. The flask, or core-box, can be filled, rammed, rolled over, the mold drawn down and brought out clear of the machine—all without the operator once having to leave his position in front of the machine. During the whole operation there are no stops or locks to bother with. Rolling over the mold requires the least possible effort, as it revolves upon its own center of gravity. As most of the weight is slightly above this center it helps to carry the mold over, but does not bring it down with a jolt, as the cam brings it accurately to a stop at the right position.

A slight pressure of the foot brings the mold-receiving table up into position. The Osborn four-pin leveling device adjusts itself to any unevenness of the bottom board, and all four pins are locked simultaneously by pushing the lever a few inches to one side. Pressing the foot treadle the second time lowers the table and brings the core or mold clear of the core-box or pattern. It is then pulled forward clear of the machine by the sliding arms, which pass through slots in the leveling pins.

They say: Compare this with the labor necessary to roll over

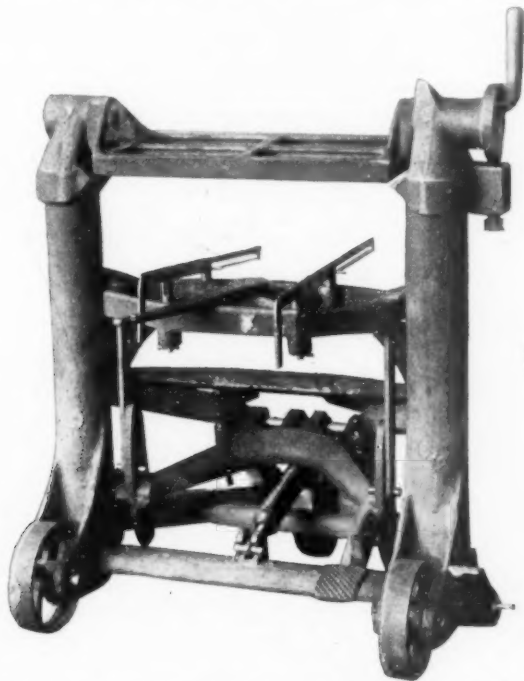


FIG. 1. LITTLE WONDER OSBORN MOLDING MACHINE.

a mold on the old-fashioned hinge type of rock-over, and the many miles which the molder must walk in a day as he passes from one end of the machine to the other, with all of the necessary locking and unlocking. General practice has shown that most core boxes can be sufficiently rammed by two or three jolts. It is also true that the ramming of many small molds can be greatly expedited by this same operation. To take advantage of this opportunity for lowering the cost of production a special foot treadle has been provided at the side of this machine, whereby the jolting operation is performed. This is a rapid operation, requires but little effort, and the workman does not move from his position. Beyond question, this is the most rapid and convenient and handy type of roll-over machine ever devised.

THE OSBORN AIR SQUEEZER MOLDING MACHINE.

This power squeezer shown in Fig. 2 is claimed to have the great advantage of a valve which permits more or less automatic operation. The valve can be adjusted to any desired pressure, from 30 to 100 pounds per square inch. As soon as the desired compression is reached, the valve not only prevents additional pressure, but signals the operator (by the hiss of escaping air) that the mold is finished. He then removes his hand

from the valve and the machine automatically returns to its off position.

This is a big point, inasmuch as the operator does not have to watch the gauge to see when the right pressure is reached, as he does with any other make of air squeezer.

Another exclusive advantage claimed for the machine is that none of the working parts are at any time exposed to dust or dirt, the table being provided with a shield, or apron, which comes down around the cylinder to a distance which is greater than the length of the ordinary stroke. The construction is very

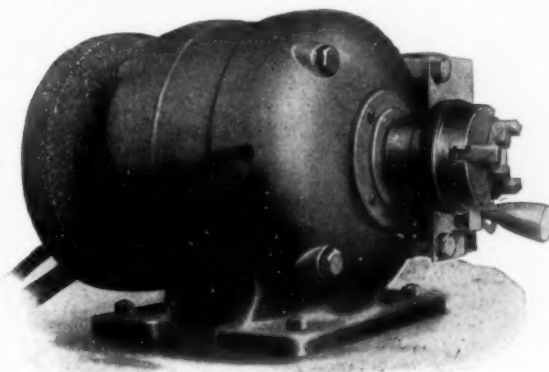


FIG. 2. OSBORN AIR SQUEEZER MOLDING MACHINE.

simple, but strong and substantial. An illustration of the way in which maximum strength is gained without unnecessary weight is to be seen in the strain-rods, which are made of nickel steel. Furthermore, these rods are direct-connected to the cylinder casting, thus eliminating all tendency to spring the machine when in operation. The handy character of the machine is increased by its convenient wheel-base, which is especially designed to make easy the shoveling of sand from under the machine. It is equipped with side table, riddle bracket, sponge pocket and parting-bag pocket. Further information and specifications of these two machines may be had from the Osborn Manufacturing Company, Cleveland, Ohio; Catalog "M."

POLISHING MACHINE

The polishing machine shown is designed for the rapid finishing of small parts, such as can be held in its 2-in. scroll chuck or 1/2-in. spring chuck.



FORBES & MEYERS POLISHING MACHINE.

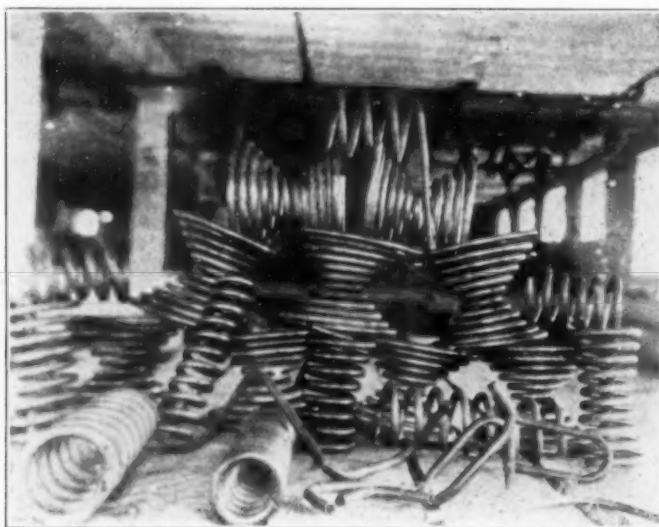
Some of its advantages as claimed by the makers, Forbes and Myers, Worcester, Mass., are:

The windings are well insulated and protected from moisture, dust and mechanical injury by covers which completely enclose them. The best quality of ball bearings are used. They are of ample size for any load that can possibly be applied. They are packed in sufficient grease to last a long time, and are protected against the entrance of dust around the shaft by double groove covers.

The rotating part is of a solid and practically indestructible construction, having no paper or fabric insulation, no bolted or soldered joints. The motor can be run continuously without overheating.

SEAMLESS COPPER COILS

The picture shows some interesting coils of copper tubing, made by a new process. The process is the invention of Walter F. Smith, an engineer and machinist, of Baltimore, Md. These coils are used in water heaters. The tube is $\frac{3}{4}$ -inch O. D. No. 20, B. W. G., and runs up to 30 feet in length. In making these coils a device is used that is operated by a boy and 20 seconds is the average time of production for any form shown.



SEAMLESS COPPER COILS MADE BY WALTER F. SMITH PROCESS.

No filler such as sand, cement, paraffin or other substance as is generally used is employed by Mr. Smith's method. Patents will soon be granted on several other ideas for handling similar material, and some plants will be soon installed. Mr. Smith is also the author of an interesting and ingenious pamphlet on lathe gearing with a special section on decimal gearing. Copies of this treatise may be had for 10 cents by writing W. F. Smith, 2653 Wilkins avenue, Baltimore, Md.

EVOLUTION IN POLISHING

By H. J. HAAS.*

For many years all polishing has been done by applying various abrasive materials, such as Tripoli, Crocus, Rouge, etc., to polishing wheels and then holding the article to the wheel to polish it, and in order to make this material in the most convenient form for this purpose it is made into sticks of a size as convenient as possible to hold, the abrasive material being mixed with various greases so that in applying them to the buff the grease and abrasive material adhere to the buffing wheel after which the article is polished. There are many disadvantages in the use of these sticks, a few are as follows: FIRST—The grease being very high in price it is necessary in order to make them at as low a figure as possible to work in the maximum amount of powder that the grease will take up. This is detrimental, because there is not enough grease left in the stick for the material to adhere to the wheel, and consequently a great part of the material flies from it in dust, in the polishing room, and also on the men doing the work, a loss to the consumer, because it does not do the work it was intended to, not enough adhering to the wheel. SECOND—The stick can only be used as long as it can be held by the workman and when it becomes too small to hold must be discarded, there-

*Haas Manufacturing Company, New York.

fore small pieces accumulate and are wasted. THIRD—Because of the grease used being of the very highest melting point the friction developed in polishing does not eliminate it and consequently the work becomes more or less coated with a film of grease, producing a bluish coloration and not giving the maximum high finish. FOURTH—The workman inhaling so much of the abrasive powder, it gets into his lungs and is apt to produce pulmonary complaints. FIFTH—In the case of Vienna lime compositions for nickel buffing, there is much loss due to the fact that it slacks when exposed to the air. At the present time each stick is put in an air-tight tin can; but if one is opened and the stick not entirely used the rest slacks and has to be thrown away.

For a long time I have been endeavoring to obviate these defects and have at last succeeded by making a composition (Pat. App. for) in patent collapsible tubes (Pat. App. for), the advantages of which are the following: FIRST—The proper amount of grease can be incorporated with the abrasive material to make a composition that when applied to the buffing wheel sticks, therefore it takes very little to do the work. SECOND—Every particle can be used, because the tube can be held until empty. THIRD—Certain volatile materials being employed in the composition the friction developed by buffing or polishing leaves the work perfectly clean and free from all bluish coloration, or greasy film, thus a higher finish is obtained. FOURTH—The workman's hands are kept perfectly clean so that in handling the work he does not smear it with grease from the compositions and rouges, necessitating repolishing. FIFTH—In the case of our composition for nickel buffing in patent collapsible tubes (Pat. App. for) it lasts indefinitely and will not slack. SIXTH—The price of our patent compositions and rouges is no higher, and they are in every way far superior to any polishes in stick form.

PEERLESS CHEMICAL[®] NEUTRAL SALTS

William T. Finkell, at one time connected with the Harshaw, Fuller & Goodwin Company, Cleveland, Ohio, and later with Finkell-Hachmeister & Company, Pittsburgh, Pa., has opened an office under his own name at 100 William street, New York, for the importation and sale of industrial and technical chemicals. Mr. Finkell has a number of lines of particular interest to platers, including his Peerless Brand sulphuret potash, which he states is extra strong and produces a black with a higher lustre and better wearing qualities than ordinary potash, and his Peerless chemical neutral salts for copper, brass, bronze and gold solutions. The purpose of these salts is to produce a brilliant red finish and at the same time keep the solution clean and clear, which it is impossible to do for any long period when the customary method of using bi-sulphite of soda is adhered to.

Mr. Finkell claims that the use of bi-sulphite of soda in plating solutions is wrong, for the reason that it is an acid salt and when used in a plating solution it neutralizes a portion of the free cyanide of potash present, then undergoes certain chemical changes and disturbs the balance of the solution and makes it necessary to give solution constant attention and frequent treatment to keep it in good working order. On the other hand, it is stated that Peerless chemical neutral salts not being an acid salt do not affect the free cyanide in any way and that the same or better results are obtained as when bi-sulphite of soda is used, while the cost of using the Peerless salts is appreciably less.

MONEL METAL WINDOW SCREENING

By "MONEL METAL."

In view of the atmospheric conditions which prevail on the Isthmus, the report which reaches us regarding "Monel Metal" window screening is of particular interest. A considerable quantity of "Monel Metal" screening was used on the sea side of the wards of the Colon Hospital, which is built in piers over the sea, for a test in comparison with brass and bronze. After six months' exposure the "Monel Metal" showed little, if any, tendency to deterioration, nor were the interstices blocked to any extent through exposure to the salt spray, as has been noted in some of the other screenings used. This screening which now has a large sale in the United States, especially on and near the seacoast, should be of great value to architects, builders, etc., who require a non-corrosive screening which is not prohibitive in cost.

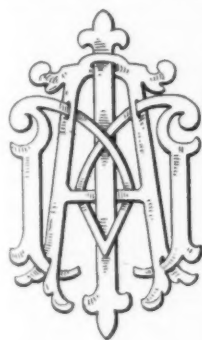


Associations and Societies

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL
INDUSTRY ORGANIZATIONS.



AMERICAN INSTITUTE OF METALS



President, L. W. Olson, Mansfield, Ohio; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held at Chicago, Ill., October 13-17, 1913.

Secretary Corse announces in reference to program for the Chicago convention that he has secured for the joint session with the American Foundrymen's Association, which will be held Tuesday afternoon, October 14, two unusually able speakers. One, Mr. M. W. Alexander, of the General Electric Company, West Lynn, Mass., who will speak on "The Apprenticeship System in the Metal Industries," and the other, Mr. C. E. Knoepfel, of New York City, who will speak on "How to Make a Time Study." Both of these subjects are very vital topics in the foundry world at the present time and should create a large amount of interest and discussion.

He also reports that there was held in Washington on Friday, September 15, a meeting of a committee from the American Institute of Metals and the American Society for Testing Materials with the Bureau of Standards. This committee acted in the capacity of an advisory committee with men from the bureau, in order to outline the proper work to be undertaken relative to the non-ferrous alloys. Dr. George K. Burgess, of the bureau, has been appointed chief of the Division of Metallurgy, and is entering on his work with a great deal of enthusiasm. The director, Dr. S. W. Stratton, is very much interested in the work and believes that there is considerable of value to be gained from the co-operation of the various technical societies with the bureau. There will be a paper describing the work of the bureau by Dr. G. K. Burgess at the Chicago meeting—also a report of the various committee meetings on the subject.

AMERICAN ELECTRO CHEMICAL SOCIETY

President, E. F. Roeber, New York; Treasurer, Pedro G. Salom; Secretary, Jos. W. Richards, Lehigh University, South Bethlehem, Pa., to whom all correspondence should be addressed. The object of the society is the advancement of electrochemistry. Meets twice a year. The XXV General Meeting will be held in New York in April, 1914.

NEW YORK SECTION.

Lawrence Addicks, chairman of the section, reports that the first meeting of the season will be held at the Chemists' Club, 52 East Forty-first street, New York, at 8:30 p. m., Friday, October 17, 1913.

The subject for the evening is "Some Applications of the Microscope to Industrial Work" and the program is as follows: Metallurgy of Carbon. G. A. Roush, Assistant Prof. Metallurgy, Lehigh University. Time allowance: 20 minutes.

The application of the principles of metallography and petrography to the identification and analysis of carbon products,

showing the development of characteristic structures and the utilization of these structures in identification and analysis.

The Microstructure of Raw and Manufactured Copper. W. H. Bassett, Technical Supt. and Metallurgist, American Brass Company. Time allowance: 15 minutes.

A series of pictures showing structure of cast copper and how this structure is altered by rolling, etc.

The Microscope in Mineralogical Analysis. Gilbert Rigg, Research Engineer. New Jersey Zinc Company. Time allowance: 15 minutes.

A series of Lumiere plates showing microphotographs of zinc ores with resolution of the minerals present.

Some Remarks on Micrometry as Applied to Alloys. Dr. C. H. Mathewson, Asst. Prof. Chemistry and Metallography, Yale University. Time allowance: 45 minutes.

The use of micrographic methods in investigating questions of constitution, qualitative and semi-quantitative interpretations; structural relations which are favorable to the development of micrometric methods; advantages and shortcomings of such methods in ordinary analytical practice; the determination of cuprous oxide in copper; of iron in zinc.

These talks will be well illustrated with lantern slides and photographs. Any member is welcome to bring guests who may be interested.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

President, Theo. Ahrens, Louisville, Ky.; Commissioner, William M. Webster. All correspondence should be addressed to the Commissioner, William M. Webster, 1112 Schiller Theater Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City in December.

The National Association of Brass Manufacturers held one of the most successful meetings of its existence at Niagara Falls, Ontario, on Tuesday and Wednesday, September 16 and 17. The attendance was unusually large, a fact which quite agreeably surprised its officers and all those who had the good fortune to be present. Quite a number of Canadian brass manufacturers who had been especially invited to attend the meeting, were present. The sessions were held in the spacious rooms of the Clifton Hotel and the proceedings were quite enthusiastic throughout. The Regar Brass Works, and the Sterling Brass Company, Cleveland, Ohio, were elected to membership.

The association adopted a uniform standard flange for all $\frac{1}{2}$ -inch to $\frac{3}{4}$ -inch and $\frac{3}{4}$ -inch compression, Fuller, self-closing and ground key bibbs, whether male or female flange, solid or loose pattern, of $2\frac{1}{4}$ inch.

The list committee, who has in hand the compiling matter for the new Official Catalog which is to be issued on the first of September, 1914, and which will embody many new goods that changed conditions have brought into use, reported progress.

The association renewed its allegiance to the matter of terms of two to ten days, from date of invoice, sixty days net. It appeared that owing to the high price as well as scarcity of ingot copper, most manufacturers felt it necessary to withdraw prices and quote new prices upon request. On Wednesday afternoon, after a most successful two-day session, the meeting adjourned to meet in New York City on December 10 and 11, and on the night of the latter day, the association is to give its annual banquet. Messrs. Hale, Hills and Webster were appointed a committee to make the necessary arrangements.



PERSONALS



ITEMS OF INTEREST TO THE INDIVIDUAL.

Chas. F. Brooker, president of the American Brass Company has been selected as a member of a protective committee to look after the interests of shareholders in the American Water Works & Guarantee Company of Pittsburgh, Pa., which recently failed. Others on this committee with Mr. Brooker are Edmund C. Converse, chairman of the Board of Directors of the Banker's Trust Company, and Albert H. Wiggin, president of the Chase National Bank of New York City.

Roy Stout, formerly foreman plater at the James N. Morehouse Company, Newark, N. J., has become connected in the same capacity with the Archibald-Klement Company of the same city.

Thomas B. Haddow, formerly an electro-plater with the August Goertz Company, Newark, N. J., has become connected with the Neubeck Plating Company, Buffalo, N. Y., who are representatives in America for Dr. Friedrich Neubeck's electro-plating preparations.

DEATHS

HERMAN HEGELER.

Herman Hegeler, of the Hegeler Brothers Zinc Smelting Company, Danville, Ill., died at the German Hospital at Chicago, Ill., August 30. Mr. Hegeler was born in La Salle, Ill., June 7, 1872, and was the second son of the late Edward C. Hegeler, who established at La Salle the Matthiessen & Hegeler Zinc Works, the largest smelting plant in the world.



HERMAN HEGELER.

many in study, investigation and research, traveling extensively

Mr. Hegeler took his degree at Ann Arbor University, later spending two years at Cornell, in supplementary courses in engineering, and still later, spending much time in Ger-

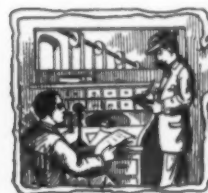
many in study, investigation and research, traveling extensively before returning home. He remained in La Salle, connected with the Matthiessen & Hegeler plant until 1905, when he came to Danville and with his brother, Julius Hegeler, established the Hegeler Brothers' Zinc Smelting Works.

He was a nephew of the famous author, Professor Julius Weisbach, whose text-book on mathematics remains, after forty years, an authority in the leading universities of the world. Mr. Hegeler was a member of the Union League and University clubs of Chicago, and a member of the Chi Psi fraternity.

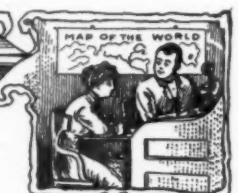
Mr. Hegeler is survived by his wife, a son, daughter, brother and five sisters.

Edward Smith, of the firm of Smith-Gallison Company, brass manufacturers, Boston, Mass., died on September 9 at the North Reading Sanitarium at the age of sixty-one. Mr. Smith for the past six years has lived at 48 Maple street, Malden, Mass., and was for twenty-five years before that a resident of Melrose Highlands and was a member of the Mount Lebanon Lodge of Masons. Mr. Smith is survived by a wife, a daughter and three sons.

Charles Z. Moers, who has been identified with the metal trades in New York for many years, died September 4 at his home, 140 Claremont avenue, New York, N. Y. He was fifty-three years old and is survived by his wife, a son and a daughter.



Trade News



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

NEW BRITAIN, CONN.

OCTOBER 6, 1913.

What is the outlook for the winter season in the New Britain manufacturing field? At the office of the P. & F. Corbin division, the largest of the American Hardware Corporation, the following information was given to THE METAL INDUSTRY correspondent: "General conditions are pretty good. We are not putting out quite the quantity of stock we were a year ago, but the financial end is just as good. I think we will have about as good a winter as we did a year ago."

"The general conditions of business in the factories is very good and it would appear as if the coming fall season would be a good one. For some unknown reason building operations hereabouts have not been as great as last year, but it is not thought that the slump will be of any duration.

"Well, it's hard to tell and we couldn't say at this time, but just at present the business in general seems to be pretty good and is picking up somewhat. I guess we'll keep busy all right."

The above are a fair average of the answers of the captains of

industry in this city to the initial question and at present the factories, both large and small, are working steadily and there seems to be no immediate reason why there should be any falling off.

At Landers, Frary & Clark, manufacturers of cutlery and domestic hardware, the concern is doing more than remain stationary. They are branching out steadily and late this month the officials announced their intentions of manufacturing shears. The company is already trying out the new line of goods. The shears are made of Danish iron and the edges are steel. With the facilities of the local plant these new products can be turned out in large quantities and at a moderate price.

Also, the various metal manufacturing concerns are paying their regular dividends and some are declaring extra dividends. At a meeting of the directors of the American Hardware Corporation held on September 23, the regular quarterly dividend of 1 1/2 per cent. was declared as well as an extra dividend of 1/4 of 1 per cent. These were payable on October 1. The Union Manufacturing Company also declared their regular dividend of 2 per cent., payable October 1.

With business conditions favorable the Traut & Hine Manufacturing Company, makers of razors and all metal novelties, celebrated its twenty-fifth anniversary on September 27, by giving a monster barbecue to its foremen and guests. The Traut & Hine Manufacturing Company was founded by Justus A. Traut, the United States patent king, and Henry C. Hine, twenty-five years ago this month. The early days of the company were ones of intense struggle and Mr. Traut and his associates had to fight patent litigation. With United States Patent Commissioner Charles E. Mitchell as their attorney they finally won out, but at the cost of thousands of dollars. The concern proved a phenomenal success and its business has been going forward with leaps and bounds ever since. George W. Traut, son of its founder, is now president of the company and under his administration the company is today branching out on a much larger scale than its founders had hoped for in their fondest dreams. President Traut is regarded as one of New Britain's most capable captains of industry. H. C. Hine is secretary of the plant and Frank L. Traut, the president's younger brother, is general superintendent.—H. R. J.

PROVIDENCE, R. I.

OCTOBER 6, 1913.

Business among the metal working industries throughout the state is brisk and the appearances are that it will continue so during the next few months. Among the manufacturing jewelry and allied trades conditions are reported as improving, although the improvement is slow and, as a rule, the factories are below the usual average for this season. Many of the travelling representatives who are either out in the western territory at present or have just returned, report finding business conditions considerably better than a month or six weeks ago, and as the time to the holidays is getting short it is confidently expected that business will pick up during the next fortnight with a rush.

A number of the manufacturing jewelry plants have already started on more hours each week, but all have been working out new schedules so as to conform to the fifty-four-hour a week law for women and children, which was adopted at the last session of the General Assembly and which went into effect the first of September. Many of the foundries of the state are running to their capacity, and orders are reported as coming in in goodly numbers. Little business is being given for future delivery, it is said, although there has been some inquiry during the last few days. Toolmakers and machinery builders are finding a fair market condition and are running at full time with encouraging future prospects.

George L. Parker and Charles Bornstein are conducting the Providence Co-operative Sheet Metal Company at 145 Eddy street, Providence, according to the statement filed at the office of the City Clerk. The Newell Brass Foundry, located on High street, Central Falls, is one of the busiest concerns in that city at the present time. Since the concern moved into its new building, erected as a result of the grade crossing eliminations, the business has materially increased, necessitating much overtime for the employees. There has been a change in the Marden & Kettley Company, manufacturing jewelers. Frederick K. Cook and George Cook have sold their stock holdings to other members of the company and have severed their connection with the corporation.

The Pawtucket Brass Foundry, North street, Pawtucket, is rushed with orders and for the past few weeks it has been found necessary to work nights to supply customers. The concern does considerable brass work needed in the manufacture of automobiles, and as the makers of these machines are pushing them so as to get ready for next season, business is brisk.

Under the auspices of a special committee appointed by the New England Manufacturing Jewelers' and Silversmiths' Association, a series of meetings are being held at the rooms of the association in this city to consider the proposed revision of the national stamping law. The committee in order to ascertain the views of the concerns engaged in the different branches and lines of the industry has divided the work and is holding meetings for the discussion of the phases of the situation that pertains to the specific branch. Thus meetings are scheduled of the manufacturers of sterling silver goods, solid gold jewelry, rolled gold and electroplate manufacturers, etc. After securing

the views of these firms the committee intends to make a resume and compilation and report to a general committee composed of representatives of jewelry associations from all sections of the country and formulate a law to be presented to Congress on the subject.

William E. Wilcox and Joseph H. Reid were arrested recently charged with the wholesale robbery of jewelry from Goldsmith & Harzberg, the Wightman & Hough Company and the Empire Manufacturing Company, tenants of the Manufacturers' Building, 101 Sabin street. Both men were arraigned and held under heavy bonds to await the action of the grand jury. Their depredations amounted to several thousand dollars. Wilcox was employed as a piper about the building and so had access to the several shops, while Reid handled the goods outside and sold them.

BOSTON, MASS.

OCTOBER 6, 1913.

For the month of September, especially the last half, an improvement in the volume of new business, compared with the preceding month's record, has been noticed. It can hardly be said as yet, however, that fall trade is satisfactory. There is still too much of the previously observed "waiting for orders" attitude to permit of that characterization. Few Boston manufacturers have confidence enough in the outlook to take any speculative chances in manufacturing.

Viewing the prospect for the balance of the year from this standpoint, F. M. Callahan, of the F. M. Callahan Co., declares that "trade demand in metal lines is fair, although hardly as steady as might be desired. Placing of orders is uneven, being of good volume for a day or two, perhaps, only to be followed by a quieter spell. It is unusual to find anyone prepared to fill orders in quantity from stock. A little delay usually ensues when goods are wanted, not because orders have accumulated, as was the case earlier in the year, but because manufacturers wait for actual specifications before turning out products in bulk."

The Union Spinning and Plating Company, Inc., which moved recently from 38 Chardon street to larger quarters at 67 Sudbury street, finds September business better than midsummer conditions were. "The outlook is more favorable now," said the company's representative, "and on lines that are specialties there is a normal demand. This applies particularly to restaurant work and kindred lines. General business, too, in metal manufactures and orders for plating of various kinds have improved during September. The outlook is encouraging for the balance of the year."

Mr. Hicks, of S. D. Hicks & Son, stated that it is quieter now in many lines of their trade than it was at the beginning of the year, but this he attributed to the indirect influence of apprehension regarding the probable effect of tariff changes upon general trade in all lines of industry.

"One feature in this connection," he added, "is worth noting. There is no real depression, as far as prices in the metal industry are concerned. Usually a period of veritable business depression is marked by a very evident slump in prices of all commodities. Except in certain lines on which radical tariff changes have been practically discounted, such as wool, for instance, prices have been strongly maintained pending the enactment of the new law.

"It seems probable that when readjustment to new conditions has been effected, the hesitancy observed while the subject has been under discussion will disappear. At all events the metal industries will only be affected incidentally, as the proposed tariff is unlikely to exert any direct adverse influence."

J. Sumner Draper and Mark T. Dowling, Boston real estate owners of prominence, have purchased the Walworth Building on Federal street in this city, valued at upward of \$300,000, and occupied by the offices of the Walworth Manufacturing Company.

Twenty brass-molders, who had been on strike since September 8, at the works of the Sanitas Manufacturing Company, Wakefield, because of their objection to Superintendent A. J. Vaughan, returned September 27 when the superintendent's resignation was announced. Mr. Vaughan is succeeded by Thomas E. McMahon.—J. S. B.

ATTLEBORO, MASS.

OCTOBER 6, 1913.

Reports from salesmen indicate a fairly busy season. The factories are beginning to rush again and the "help wanted" advertisements, which are the surest barometer of local conditions, were never more numerous for the past few years than now. The silver shops are all running on full time. Vanity and puff boxes and blue bird pins seem to have the present call for fads.

The Aetna Manufacturing Company has removed from 218 Pleasant street to 34 County street to meet the need for larger quarters. The new Makepeace factory will be ready for occupation this fall. The interest of Edgar L. Hixon in the R. F. Simmons Company has been purchased by J. L. and Harold E. Sweet. Mr. Hixon has been a member of the house since 1874. The T. I. Smith Company has given up its Rhode Island charter and continues under a partnership form.—C. C. C.

NEW YORK, N. Y.**HOW EDITORIAL EFFICIENCY HELPS THE ADVERTISER**

AN ADDRESS DELIVERED BY J. C. MCQUISTON,* AT THE CONVENTION OF THE FEDERATION OF TRADE PRESS ASSOCIATION, NEW YORK, SEPTEMBER 18-20, 1913.

There seems to be a natural tendency for men engaged in editorial work to become chained to their desk and offices. Many editors would be better off without an office, which too often develops the Micawber trance "waiting for something to turn up."

The live papers that speak the inners of the activities of their fields are those which have editors moving about in the field, meeting and discussing with the leaders and the operatives; all the while having an ear to the ground to get the spirit of a message for the enlightenment of their readers. Information secured any other way is second hand and indirect, and in one way or another will be recognized as such; always incomplete and often inaccurate.

Of course there are publications with organized editorial forces to care for the field work, often dividing the assignment so that men who are more or less specialists give attention to subjects which might be impossible for the editor himself to do; still, the editor who regulates what shall be said and what shall not be said should more often be outside than inside; gaining an intimate personal knowledge of things pertaining to the business.

The editor of a trade or technical paper should familiarize himself with the activities, and for that matter the inactivities, of those interests and people responsible for the perpetuation and improvement of the industry.

I fully believe the trade paper should be a mold of public opinion in the industry to which it caters. The matter published therein and the editorial comment thereon should be so full of good meat that the people of the trade will naturally look to it as the final word on any subject touching their interests.

Having led his clientele to this point, it is incumbent on the editor to continue in the vanguard of the profession by leading thought and action toward the betterment of conditions surrounding the industry. It could do this by advocating progressive policies; giving authentic news and data on the latest improvements and commenting on them in an intelligent and helpful way when of sufficient importance, so as to properly enlighten the readers.

It seems to me a trade paper should have a definite policy in view and closely adhere thereto. This policy should not be so rigidly enforced to the extent of making the journal narrow and always harping on one line, tiring its readers. A journal I have in mind has adopted a motto which it honestly endeavors to live up to, and I believe clearly states the point "To make engineering merit and usefulness to its readers its editorial criterion." Supplementing this, the journal states "To be of use to its readers; to be of real assistance to engineers, present and future, and to be an active force in accelerating the progress and advancing the best interests of the profession." A great aid and convenience to the busy man is the custom of placing at the head of each article a synopsis, so that the reader can tell just what the article deals with.

*Publicity Department, The Westinghouse Companies.

In closing let me say frankly that I believe there are a great many weekly papers that should rightly be monthly papers. There are comparatively few lines of trade that can really support a weekly paper, and one is forced to believe that many of them are issued weekly, not because of the abundance of timely editorial matter, but because they get four or five chances to one per month at the advertiser. The result is that the editorial matter is poor and thin. Were all this collected in one monthly issue a creditable publication would result.

NEWARK, N. J.

OCTOBER 6, 1913.

The manufacturing jewelers are working steadily on the fall and holiday trade and look for a moderate demand. Platinum goods are selling about as well as last year. Ten-karat gold goods have the call, while 14 and 18-karat are still a little slow. Silver novelties are selling very well. German silver mesh bags and plater goods have had a good demand. Metal novelties of brass, aluminum, copper, bronze, white metal, nickel, etc., have more than held their own. The plating lines have done well. Coloring, enamel work, engraving, engine turning, hub and die work, stone setting and other special lines have had the usual run. The refining and smelting lines have been busy. The making of watch cases here is on the increase. Watch materials were slow, but show improvement. Rings, la vallieres, pendants, stick pins, bracelets, mesh bags, etc., have been in good demand. Chains have been a trifle slow. The watch trade is picking up. The gold, silver, brass and bronze foundries have had a slow year. The stones in demand as settings are diamonds, pearls, sapphires, cameos, amethysts, etc.

Albert Cohn, late buyer for the National Enameling & Stamping Company, of New York City, has opened an optical office in Rutherford, N. J. The Newark Sheet Metal Company, a new firm, at 216 High street, have their factory in good shape, making metal goods and doing stamping, spinning and electroplating.

Louis G. Flanigan, who was with Kahn & Company, and Julius Weinbrecht, who was one of the firm of Burstow, Kollmar & Company have started a good plant to manufacture and repair jewelry at 20 Columbia street. They will also do plating, engraving, enameling, coloring, mesh bag work, etc. Theodore Schanbacher, who was with the Otto Schanbacher Company, has started in manufacturing jewelry at 67 Hamilton street.

C. Lemaitre & Company, making jeweler's findings, have moved their factory from 25 Boudinot street to 97 Chestnut. W. Luct has started in stone setting at 38 Crawford street. H. F. Habiet, die cutter, of 46 Oliver street, has made improvements to his place.

The John J. Jackson Company, working in sheet, wire and anode sterling silver, have moved their plant from Mechanic street to their own building, erected at 156 Astor street. The facilities have been enlarged and improved. Do not work now in the gold plate business. Have put in a new furnace and up-to-date machinery. Baker & Company, platinum refiners and smelters and also manufacturing jeweler's findings, have completed the erection of a large addition to their plant.

The Scientific Optical Company, a new firm, have put in a large plant at 397 Market street, to make optical goods. K. M. Baum is president and general manager; Wheelock Bigelow, assistant manager; H. L. Whittemore, in charge of mechanical work; Maurice Hecksher, vice-president, in charge of the New York City office, at 576 Fifth avenue; C. B. Jaqua, secretary and treasurer; William Carter, superintendent. Messrs Baum, Bigelow and Carter were with the American Optical Company, of Southbridge, Mass.—H. S.

YORK, PA.

OCTOBER 6, 1913.

York is a progressive place of 50,000 inhabitants and is growing. It is the third largest manufacturing place in the state. It is being boomed in the papers by the Board of Trade, and new industries are looked for. There is considerable in the metal lines here, one of the largest lines being chain, which is galvanized, and some of it plated.

The Diamond Chain Company make some galvanized chain for the saddlery and hardware trades. They started with two forges

and now have eighteen. Will enlarge the works and increase the capacity.

The Standard Chain Company, of Pittsburgh, have a large branch factory here. Their plant was burned out in Vine street and has now been rebuilt of steel and brick, having 19,000 square feet of floor space. The new plant has 60 or 70 double forges, making some galvanized chain. They do not export any as this chain can be made cheaper in Europe. They have put in a galvanizing plant.

The Standard Plating Company, of 249 North George street, do all kinds of gold, silver and nickel plating, as well as galvanizing.

The Pennsylvania Foundry Company have been in the hands of a receiver, but have kept on working. The Eberton Brass Foundry went out of business. J. S. Lindemuth, of 244 East College avenue, will put in a gold, silver and nickel plating plant.—H. S.

COLUMBUS, OHIO

OCTOBER 6, 1913.

The metal market in Columbus and vicinity is marking time as it were. There are no particular changes from a month ago and the demand is holding up pretty steady. The outlook for the future is considered satisfactory generally, although some of the dealers are not the most optimistic. There are prospects of a number of new metal using concerns in this section and these are being watched with considerable interest.

The brass market is about nominal with the movement fair for the season. Red brass scrap No. 1 is quoted at 13½ to 13¾ cents to the trade while yellow brass scrap is 10 cents.

Aluminum is holding up well, although no special feature is discernible. It is quoted at from 22 to 23 cents to the trade. Copper is rather strong and is sold at 15¼ to 15¾ cents in crucible shape.

Babbitt metal is moving well and is probably the strongest point in the trade. The demand is steady and the volume is increasing as the printing business improves. Other metals are unchanged from the previous month.

Henry Loeb, of the Ohio Metal Company, believes that trade in metals in the coming winter will be good and prices are expected to increase slightly. He says that manufacturing is in good condition here and that many concerns will increase their requirements from this time on.

Auto brass factories and repair shops look for a good season during the winter. In fact, they have been rushed with work during the greater part of the present year and are generally increasing their facilities for the coming year.

The Ohio Metal Company, which has been located at 502 Kimball street, has purchased a site at the corner of Fourth avenue and Fourth street upon which a modern plant will be erected at once. It will be a one-story building 150 feet by 50 feet. It is expected to have the structure completed by the first of the year if not sooner.

TORONTO, ONTARIO, CANADA

OCTOBER 6, 1913.

This city is growing fast and now has a population of 450,000. It is making rapid advances as a manufacturing center, working to a considerable extent in brass, copper, lead, bronze, tin, aluminum, gold, silver, etc. Considerable jewelry is made here, silver and German silver articles, watch cases, novelties, and enameled jewelry is very much in demand. It is a progressive place and has adopted American methods. Business is on the increase, factories are being enlarged and new ones started. As a jobbing center its lines and American lines as well are distributed to all the provinces of Canada, from the Atlantic to the Pacific ocean.

The writer attended the Canadian National exhibition, which is now in its thirty-fifth year and a yearly exposition that this city and Canada as a whole can well be proud of. It is now reaching out for exhibits from European countries. This year Austria sent a large exhibit; also Bahama Islands, West Indies, etc. The United States was well represented. The total attendance was around the million mark for the period of two weeks. The exhibits in the metal lines were very complete and comprehensive.

The Standard Silver Company, making plated ware, had a good exhibit, in charge of R. F. Clarkson. They have built a new four-story factory, which is most up to date. P. T. Sowden, late with the International Silver Company, of Meriden, Conn., is the new manager.

Keith's, Ltd., who succeeded Keith & Fitzsimmons, at 111 West King street, has an exhibit of brass ecclesiastical and ornamental work.

P. W. Ellis has an exhibit. He makes the silver and gold Ellis watch case, and also jewelry. The exhibit was in charge of M. L. Ellis and C. Walter Hopkins. Clyde Black is new manager of the New York office at 21 Maiden Lane. The silver rolled plate and medal department of the factory has been turned over to R. C. Ellis, who succeeds Harry Woodruff. The latter now represents the Simmons Chain Company of Attleboro, Mass., for their Canadian trade.

Patterson & Howard exhibited their bronze tablets and signs. W. H. Banfield & Sons were showing their attractive lines of brass chandeliers and parts.

The Chadwick Brass Company, of Hamilton, made a fine display of brass goods.

Mrs. J. Ehrke, of Vancouver, B. C., shows her hand made silver filigree jewelry.

Herbert H. Dodd represented the Tisdale Iron Stable Fittings Company, of 19 Temperance street, and exhibited brass and iron stable fittings. They have enlarged their factory.

The Ware Manufacturing Company, of Oakville, Ont., showing aluminum lines.

The Tallman Brass & Metal Company, of Hamilton, had a special exhibit, showing brass goods, castings, Babbitt metal, solder and their own Arctic metal.

Hudson Bros. presented an attractive line of aluminum goods.

The James Morrison Brass Manufacturing Company attracted attention with their brass goods.

The Carborundum Company, of Niagara Falls, had a good exhibit of their well-known lines.

The Northern Aluminum Company had their lines attractively displayed.

The Monarch Brass Manufacturing Company had a fine line of brass goods.

The Royal Metal Works of Tiel, Holland, were showing their brass goods, which factory is owned by J. N. Doalderop and Sons. Their agent here is H. U. Nierhoff, of 128 West King street.

A. S. Flint was in charge of the Waltham Watch Company's exhibit, where watches were shown from \$1,000 down. Bracelet and barrette watches were featured and one large watch cost \$6,000 to make.

The Women's Art Association of Canada had a pretty exhibit of hand made jewelry and hammered brass.

The South Bend Watch Company was represented by J. M. Chillas, who displayed all models of the Studebaker railroad watch. One watch was shown frozen in a cake of ice keeping perfect time. Their Canadian agents are Dickens, Cockburn & Company, of 45 Yonge street.

The George B. Meadows Company, of 479 West Wellington street, operating the Toronto Wire, Iron and Brass Works Company, had a line of brass goods.

The Canadian Metal Company had an instructive exhibit of babbitt metal, tin, solder, lead pipe, zincs and newspaper metal, in charge of W. G. Harris. They had an attractive sign representing a man pouring metal. Mr. Harris says lead and tin are very high in price. Last year was a big one, and they have doubled their capacity. Have made improvements and enlargements costing \$50,000.

The Canadian Aluminum Products Company, of 110 King street, had a comprehensive exhibit of aluminum products and silver plated work. This firm have a connection with Julius and August Erbsloh, of Germany.

The Lumen Bearing Company, of this city, had a very good exhibit, in charge of their new manager, K. V. Myers. The new foreman of this factory is Frank Fenton, who came from the southern states. They have put up a new building for die casting and installed new machinery to increase the output.

The British Aluminum Company, of Scotland, were represented by T. G. Leith.

The Canadian Metals Company were showing metals of all kinds.

The following exhibits were shown from Austria: Wilhelm Kunz, Vienna, jewelry; P. Grunwald, Vienna, metal goods; Philip Kohn, Vienna, watches; Wolf, Baad and Company, of Vienna, and Bruder Lokesh of Prague, metal ware; Mathe, Salcher & Sohne, Vienna, brass and metal buttons; Anton Havel, Vienna, German silver mesh bags; Friedrich Diamant and Company, Gablong, jewelry; Wolkenstein & Gluckselig, Vienna, silver goods; Arthur Krupp, Berndorf, metal goods; John Zekert & Sohn, Meistersdorf, Bohemia, bronze ware; Arthur Rubinstein, Vienna, artistic bronze goods. The Canadian Society of Applied Arts had a large and artistic display of hand made jewelry, silver goods and hammered brass. Ambrose Kent & Sons were showing their line of secret society jewels, emblems and badges.

The Canadian Rogers Company have plans for a new three-story and basement brick factory at 570 West King street, for the manufacture of silverware. The factory will cost \$25,000 and will be fully equipped with the best machinery.

The Benedict-Proctor Manufacturing Company, of this city, is a subsidiary of the Benedict Manufacturing Company of Syracuse, N. Y. Their factory was started here less than a year ago. Their business here has been enlarged by the purchase of the Defries-Woodman Company of Alliston, Canada. The entire plant has been moved to Alliston, which will be enlarged to handle the company's entire foreign trade. The company will manufacture jewelry and silverware. The plant at Syracuse is working to full capacity.—H. S.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

Harry Butter & Co., East Cambridge, Mass., scrap metal refiners, contemplate the erection of a new metal refining plant at Dorchester, Mass.

The Tottenville Copper Company, Tottenville, Staten Island, N. Y., manufacturers of ingot copper, have erected a new addition to their plant.

The Pyle Brass & Aluminum Works, Akron, Ohio, are erecting a new brass and aluminum foundry. The building is to be made of concrete block and will be located on Glenwood avenue, Akron.

The Graphite Metallizing Corporation of Yonkers, N. Y., is building a plant to operate a process which consists in impregnating graphite with various metals, for use in electrical and lubricating fields.

The Valtin Hafner Jewelry & Piano Company, manufacturers and dealers in diamonds, watches, jewelry, fancy goods and musical instruments, Smithville, Tex., are about to install a plating department in their store.

The Metal Treating and Equipment Company, 1784 Broadway, New York, have opened up a plant at 834 Humbolt street, Brooklyn, N. Y., to do job galvanizing work by their improved "Standard Process" of electro-galvanizing.

The Robert Mitchel Company, Montreal, Can., manufacturers of plumbers' brass goods, have erected a gray iron foundry which has been working since August 1. This company also have a brass foundry, plating room and metal working shop.

S. M. Udale, formerly assistant research engineer with the Studebaker corporation, is now in charge of the laboratory and motor-testing plant of Joseph Tracy, whose New York office is in the United States Rubber Building, 1790 Broadway.

R. P. Morris has opened a shop at the corner of Westfield avenue and Miller street, Waterloo, Ia., where pattern work, both wood and metal will be done. He will also manufacture a line of friction clutch pulleys and pump jacks and will add other articles as he goes along.

The Quigley Furnace & Foundry Company, Springfield, Mass., builders of powdered coal, oil and gas burning equipment, report that since completion their shops have been kept busy to full capacity, many of their large contracts extending well into next year.

The West Bend Aluminum Company, West Bend, Wis., manufacturers of aluminum utensils and stampings, is having plans prepared for replacing its present frame buildings with brick ones early in next year. New equipment of presses with individual electric drive will be required. Carl Wentdorf is superintendent.

Robert Hanus, of Warsaw, Leszno No. 17, Russia, announces that he has opened an office for import and export business.

Through this office Mr. Hanus states, English and African firms can safely sell their goods in Russia, and its organization allows him to despatch promptly and carefully any inquiry, order or demand for mediation.

Thomas Watts Coslett, of Birmingham, England, the inventor of the iron and steel protecting process known as "Coslettizing," has won in an interference with F. R. G. S. Richards. Coslett's process consists in forming a rust-proof coating of a black color on iron or steel by boiling in a solution of phosphoric acid and phosphate of iron.

Leitelt Brothers, founders of brass, bronze, aluminum and other non-ferrous metals, 6338 Madison avenue, Chicago, Ill., announce that they have broken ground for a new modern foundry building, to be located at 7731 to 7733 South Chicago avenue, Chicago, Ill. The company state the erection of this building is necessary on account of their rapidly increasing business.

A tract of forty-six lots in Newark, N. J., for industrial development has been sold by Louis Schlesinger for John H. Lidgerwood to the Aluminum Goods Manufacturing Company. The property covers the plots known as 520 to 564 Belmont avenue and 214 to 256 Ridgewood avenue. It is reported that the buyers intend to erect on the land a large factory for the manufacture of aluminum goods.

The Hill & Griffith Company, Cincinnati, Ohio, have bought the full line of polishers' and platers' supplies of The Detroit Foundry Supply Company, Detroit, Mich. The Hill & Griffith Company also announce that they have installed, at their Cincinnati plant, the necessary machinery for the manufacture of all goods formerly made by The Detroit Foundry Supply Company, to insure a uniform quality of goods and excellent service.

The Delaware Brass and Aluminum Company, manufacturers of brass, bronze and aluminum castings and alloys, Muncie, Ind., have erected a building at the corner of Twentieth and Walnut streets, 60 x 80 feet, and are now doing business. They have a capacity for molding and melting from 3,000 to 4,000 pounds of clean castings per day. Their president and secretary were formerly actively connected with the Machinists' Foundry Company, of Muncie, Ind.

A new factory has been started at Greenfield, Mass., for the manufacture of jewelry by H. F. Koonz, who was formerly connected with the A. F. Towle & Sons Company. Mr. Koonz is a skilled designer of work in precious metals and comes from Melrose Highlands, where he has been located for the past thirteen years. About fifteen people are now employed and it is thought that eventually the number will be increased to fifty.

A convention of Pennsylvania Industrial Welfare and Efficiency will be held by the Engineers' Society at Harrisburg, Pa., October 27 to 31. This convention is called by the Hon. John Price Jackson, Commissioner of the new State Department of Labor and Industry to enable the heads of the State Departments, en-

gineers, manufacturers, labor and others interested in the causes of industrial welfare and efficiency to discuss these topics together, and to suggest legislation and other means of bringing about the co-operation and better understanding of the modern industrial conditions by the various interests involved.

The T. Robert Jenkins Brass Company will erect a one-story manufacturing building at 527-529 Colvin street, Baltimore, Md., of steel and corrugated iron, 38 x 38 feet. The cost is estimated at \$2,500. The building, when completed, will enable them to install ten new brass furnaces, which will triple the daily output which they find to be necessary in order to take care of demands. They have a foundry and metal-working shop, casting brass, bronze and aluminum and finish same when required. They have no plating shop at the present time, but if their demands in this line still continue to increase they will be forced to install a polishing and nickel plating plant.

The Condensite Company of America has acknowledged the validity of Dr. L. H. Baekeland's patents, and the pioneer character of his work in "Bakelite," and the suits of the General Bakelite Company against the Condensite Company of America have been withdrawn, the latter company agreeing to pay the former company substantial royalties. The Condensite Company will continue to make Condensite under the Aylsworth patents, and the General Bakelite Company will continue to make Bakelite.

In recognition of his achievements the Chicago Section of the American Chemical Society awarded the Willard Gibbs medal to Dr. Leo H. Baekeland.

FIRE PREVENTION CONVENTION

A National Fire Prevention Convention will be held by the Fire Prevention Commission, of the Department of Public Safety, in Philadelphia, October 13 to 18, 1913. An extended program has been arranged and is contained in a pamphlet issued by the commission. Copies may be had by addressing Powell Evans, chairman, 420 City Hall, Philadelphia, Pa.

MUNICIPAL YEAR BOOK

Every citizen of the United States (particularly of the City of New York) who desires information regarding the government of the City of New York should send for the Municipal Year Book, issued by the Merchants' Association of New York City. Like all printed matter issued by the Merchants' Association this book contains in a nut shell, so to speak, the complete workings of the city government, taking up in turn each department and giving complete, condensed information. The Merchants' Association is forever working for the betterment of New York City and is a board of public citizens, who exemplify the association's axiom, "To Foster the Trade and Welfare of New York City."

TEN TONS OF BRONZE CASTINGS

The American Manganese Bronze Company, with offices at 99 John street, New York, and a plant at Holmesburg, Pa., has become very successful in capturing orders for castings to be used in connection with irrigation dams, the latest contract being an order for about ten tons of bronze castings of high physical requirements for the Sluice and Penstock gates of the Elephant Butte Dam, New Mexico.

The dam is for the United States Reclamation Service (Department of the Interior) and is known as the "Rio Grande Project," New Mexico-Texas. The contract for the Sluice and Penstock gates was awarded to the Hinman Hydraulic Manufacturing Company, of Denver, Colo., and the construction is by the Vulcan Iron Works of the same city. The contract for the bronze castings and forgings has been, as mentioned, awarded to the American Manganese Bronze Company and is being executed at their works at Holmesburg, Philadelphia, Pa.

SOME CHICAGO EXHIBITORS

J. W. Paxson Company, Philadelphia, Pa. This company will be represented by Howard M. Bougher, president and general manager; W. S. Thomas, Eastern representative, and I. F. Kremer, assistant engineer.

The company will exhibit sand blast machinery, including standard sand blast machines, tilting sand blast tumbling barrels, hand cleaning machines, suction elevator and separator. A large number of blue prints and photographs showing recent sand blast installations will also be an exhibit.

Pangborn Corporation, Hagerstown, Md. This company will be represented by Thomas W. Pangborn, president; John C. Pangborn, vice-president; H. D. Gates, secretary; Foster J. Hull, engineer.

Exhibit will include "Pangborn" standard Type "C" sand-blast machine, in various sizes, sand-blast barrel in operation, new sand-blast car, Type "M" sand separator, ideal sand-dryer, modern moisture and oil separator. There will also be photographs of work done and installations of various types, and engineers will be in attendance to consult with foundrymen, as to the adaptability of various equipment to their requirements.

Vulcan Sales Engineering Company, Chicago, Ill. Representatives: E. H. Mumford, vice-president and general manager of the Mumford Molding Machine Company; James T. Lee, Western representative; J. T. Georgeson, T. J. Mumford, Carl Falk, W. H. Hullster, A. B. Caleen, David M. Whyte.

The exhibit will consist of:

Mumford Molding Machine Company's Products—Plain jolt ramming machines, electric cam jolter, pattern drawing mechanisms, power and hand squeezers, split pattern machines, hand and knee valves, vibrators and blow valves.

Q. M. S. Company's Products—Steel foundry cold metal saw, cut off type cold metal saw, bar cutting cold metal saw, hack saws (three sizes), automatic saw grinder, cranes, trolleys and hoists.

Hanna Engineering Works—Pneumatic and electric sand shakers, rotary dumping riddle, pneumatic yoke riveter, portable pneumatic punch, mold dryer.

CHANGE IN FIRM NAME

The H. S. Metal Specialty Company, of Cleveland, Ohio, has filed papers with the Secretary of State, changing its name to the S. Kelley Brackett Company.

INCREASE OF CAPITAL STOCK

The Atlantic Foundry Company, of Cleveland, Ohio, has filed papers with the Secretary of State, increasing its capital stock from \$35,000 to \$100,000.

The Cincinnati Stamping Company, of Cincinnati, Ohio, has filed papers with the Secretary of State, increasing its capital stock from \$75,000 to \$100,000.

The Buckeye Aluminum Company, of Wooster, Ohio, has filed papers with the Secretary of State, increasing its capital stock from \$150,000 to \$250,000.

REMOVALS

The Chas. K. Schweizer Company, makers of smelters' and refiners' solder and babbitt molds, 312 Olive street, St. Louis, Mo., have moved to 214 Vine street, St. Louis, Mo.

D. B. Moyer, of the Detroit Platers' Supply Company, manufacturers and jobbers in electro-plating, polishing and buffing supplies, 313 Hammond Building, Detroit, Mich., has moved the office to 157 Tennyson avenue, Detroit, Mich.

The proposed New York City Civic Center will necessitate the removal of the main office and warehouses of a well known

concern, U. T. Hungerford Brass & Copper Company, from the quarters so long occupied, corner Pearl and Park streets, New York, as it is expected the property will be purchased by the city.

It is learned that the Hungerford company have purchased a large parcel of ground fronting on Lafayette street, opposite the Criminal Court House and running through from White to Franklin street, on which they are erecting a sixteen-story fire-proof office and warehouse building.

Contract has been let to the George A. Fuller Company, who have already commenced work and expect to have the building ready for occupancy next July.

The large stock of brass and copper material carried by the Hungerford company is exceptionally heavy. The building is being strongly constructed to meet these requirements and will be equipped with all modern appliances to facilitate handling.

FOREIGN TRADE OPPORTUNITIES

[In applying for addresses at Bureau of Foreign and Domestic Commerce, Washington, D. C., refer to file number.]

No. 11656. Copper Wire, Tubes, and Sheets.—A German distributor of metal wire, tubes, and sheets informs an American consular officer that he is desirous of forming connections with American manufacturers of copper wire, tubes, and copper sheets.

No. 11754. Polishing stones, emery wheels, vaseline, and machine tools.—A large and important firm of watch and clock spring manufacturers in a European country informs an American consulate that he would be glad to hear from manufacturers of the following articles: Polishing stones, emery wheels, vaseline guaranteed free from acid, and various American machine tools. Correspondence may be in German, French, or English.

No. 11748. Electrotechnic and electrochemical machines and instruments.—A dealer in electrotechnic, scientific, and similar machines and instruments informs an American consular officer that he desires to correspond with American manufacturers of machines and instruments in this line for the purpose of placing himself in a position to offer such machines to the various departments of a Government institute of technology which is on the point of equipping its laboratories and workshops with the most modern machines and instruments in all lines of science. The inquirer desires illustrated catalogs, price lists, etc.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

To Plate Metals.—Excelsior Plating Company, Lancaster, Pa. Capital \$5,000. Incorporators: John M. Kreider, A. Ross Weaver and Aldus J. Weaver.

To Manufacture Wheels and Bushings of White Metal.—The Torrey-Eggleston Bushing Company, Poughkeepsie, N. Y. Capital \$50,000. Incorporators: Daniel J. Gleason, Francis B. Torrey and Lorin J. Eggleston.

To manufacture and deal in all kinds of sheet metal work.—The Charpiot Mills Manufacturing Company, Toledo, Ohio. Capital \$20,000. Incorporators: A. L. Mayer, T. S. Powell, John J. Keil, C. W. Neilson and Nat Smalley.

To deal in brass goods of all kinds.—The Leader Brass Foundry & Manufacturing Company, Cleveland, Ohio. Capital \$10,000. Incorporators: Friedrich W. Ficht, Henry W. Ficht, Friedrich W. Ficht, Jr., Albert H. Meyer and Anna Ficht.

PRINTED MATTER

Steam Turbines.—Of the velocity stage type are fully described in a small fifty page booklet just issued by the De Laval Steam Turbine Company, Trenton, N. J.

To conduct a nickel-plating and polishing business.—The Beloit Nickel Plating and Manufacturing Company, 1022 Central avenue, Beloit, Wis. Incorporators: G. A. Raguse and P. F. Keklenski.

Drying-out Machines.—The American Machine and Tool Company, Boston, Mass., issue a folder illustrating a line of centrifugal oil separators and drying-out machines for chemicals and metal articles. Chief among these machines is the Ropers' Centrifugal Oil Separator for recovering oil from chips and turnings.

Match Plates.—The Goodale Company, of Kalamazoo, Mich., have issued an attractive little booklet giving a description of the Goodale Match Plates. A number of very persuasive arguments are set forth as to why more and better castings can be produced from these match plates for less money than is possible on any other equipment. Copies may be obtained from the Goodale Company upon request.

Metallographic Testing.—The Department of Commerce has issued a circular of the Bureau of Standards, No. 42. This circular is intended to bring before those interested the tests which the Bureau of Standards is equipped for carrying out and the conditions under which such tests are made. Some valuable information is given in the booklet, which may be had by application to the Department of Commerce.

Art Metal.—Under the above heading the Art Metal Construction Company, of Jamestown, N. Y., have issued a comprehensive catalog No. 800 of supplies for filing systems. This pamphlet gives a complete list and description of the extensive line of index filing system supplies manufactured by this company. Copies of the No. 800 catalog and also of No. 755 of steel office furniture may be had on request.

Electric Pyrometers.—The Brown Instrument Company of Philadelphia, Pa., have just issued a very interesting pamphlet which contains a letter sent to four thousand users of Brown Electric Pyrometers. From the replies to this letter one hundred have been selected as most representative and are contained in the pamphlet. These letters should prove very interesting and instructive to anyone who may be desirous of deciding the pyrometer question.

Monel Metal.—A price list of wire cloth made of this metal and also brass, copper, and bronze has been issued by the Biddle Hardware Company, 150 Chambers street, New York, and 513 to 517 Commerce street, Philadelphia. The price list includes complete specifications of wire cloth made from sterling and German silver, pure nickel and Monel metal, phosphor bronze, copper, brass and steel, in all meshes and gauges of wire. There is also given a comparison of the various metal gauges.

Counting Machines.—The National Scale Company, of Chicopee Falls, Mass., have issued a catalog of the counting machines manufactured by their counting machine department. It is said that these machines give an accurate and quick count of any commodity, consisting of similar parts or pieces, without the use of tabulated figures of weights, mental calculation, or figuring of any kind. A complete description of such machines, together with information relating to the National Chapman Elevating Truck, are given in the catalog, which may be had upon request for Catalog N.

THE UNDERWOOD TARIFF LAW

A LIST OF THE ARTICLES MOST USED IN THE METAL INDUSTRIES AFFECTED BY THE NEW LAW JUST PASSED.

SCHEDULE A.						
CHEMICALS.						
Article.	Old Rate.	New Rate.	Inc. or Dec.			
Boric acid	3c. lb.	3/4c. lb.	— 2 1/4c. lb.	Aluminum, plates, bars, etc.	55.16%	3 1/2c. lb. —37.66%
Citric acid	7c. lb.	5c. lb.	— 2c. lb.	Barium, calcium, sodium...	.....	.....
Formic acid	25%	1 1/4c. lb.	+ 8.15%	Magnesium and potassium...	27.79%	25% — 2.79%
Gallic acid	8c. lb.	6c. lb.	— 2c. lb.	Antimony	27.38%	.....
Lactic acid	3c. lb.	1 1/2c. lb.	— 1 1/2c. lb.	Antimony, regulus	27.38%	10% —17.38%
Oxalic acid	2c. lb.	1 1/2c. lb.	— 1/2c. lb.	Antimony ore	27.38%	Free —27.38%
Pyrogalllic acid	25%	12c. lb.	— 9.5%	Antimony oxide salts.....	59.69%	25% —34.69%
Salicylic acid	5c. lb.	2 1/2c. lb.	— 2 1/2c. lb.	Argentine, or German silver		
Tannic acid	35c. lb.	5c. lb.	—30c. lb.	not manufactured	25%	15% —10%
Tartaric acid	5c. lb.	3 1/2c. lb.	— 1 1/2c. lb.	Bronze powders	41.88%	25% —16.88%
Other acids	25%	15%	—10%	Bronze, Dutch metal and		
Acetic anhydrid.....	2 1/2c. lb.	2 1/2c. lb.	None	aluminum leaf	50.02%	25% —25.02%
Acetone	25%	1c. lb.	(A)	Braziers' copper	10.82%	5% — 5.82%
Alkalies	25%	15%	—10%	Gold leaf	38.77%	35% — 3.77%
Alum	36.36%	15%	—21.36%	Silver leaf	79.42%	30% —49.42%
Alumina hydrate	24.19%	15%	— 9.19%	Tinsel wire	10.59%	6% — 4.59%
Ammonia carbonate	1 1/4c. lb.	3/4c. lb.	— 3/4c. lb.	Lead bullion, gross, or pigs	94.23%	25% —69.23%
Ammonia phosphate	25%	1c. lb.	—10%	Sheet lead	40.70%	25% —15.70%
Ammonia anhydrous	5c. lb.	2 1/2c. lb.	— 2 1/2c. lb.	Nickel and nickel oxide....	15.96%	10% — 5.96%
Argols (crude tartar)	5%	5%	None	Nickel sheets or strips....	35%	20% —15%
Argols under 90%.....	3c. lb.	5%	—18.20%	Quicksilver	13.50%	10% — 3.50%
Argols over 90%.....	4c. lb.	2 1/2c. lb.	— 1 1/2c. lb.	Type metal	37.17%	15% —22.17%
Rochelle salts	3c. lb.	2 1/2c. lb.	— 1/2c. lb.	New type	25%	15% —10%
Cream of tartar.....	5c. lb.	2 1/2c. lb.	— 2 1/2c. lb.	Zinc in blocks or pigs and		
Barium chloride	25%	1/4c. lb.	None	zinc dust	23.69%	15% — 8.69%
Barium dioxide	25%	1 1/2c. lb.	— 3.57%	Zinc in sheets.....	17.76%	15% — 2.76%
Barium carbonate	25%	15%	—10%	Coated zinc in sheets.....	18.62%	15% — 3.62%
Polishing powders	25%	15%	—10%	Old zinc	24.17%	15% — 9.17%
Bleaching powder	1/4c. lb.	1/10c. lb.	—1/10c. lb.	Aluminum, brass, bronze		
Chalk, ground	43.10%	25%	—18.10%	wares	45%	20% —25%
Chalk, manufactures	25%	25%	None	Copper wares	45%	20% — 5%
Sulphuric ether	8c. lb.	4c. lb.	— 4c. lb.	Gold wares	45%	50% + 5%
Formaldehyde	25%	1c. lb.	—21%	Silver wares	45%	50% + 5%
Fusel oil	1/4c. lb.	1/4c. lb.	None	Lead articles	45%	20% —25%
Isinglass	39.21%	25%	—14.21%	Metal composition	45%	20% —25%
Agaragar	25%	20%	— 5%	Nickel wares	45%	20% —25%
Glycerin, crude	1c. lb.	1c. lb.	None	Pewter wares	45%	20% —25%
Glycerin, refined	3c. lb.	2c. lb.	— 1c. lb.	Platinum wares	45%	50% + 5%
Gum arabic	Free	1/2c. lb.	+ 1/2c. lb.	Tin wares	45%	20% —25%
LEAD PIGMENTS—				Tinfoil	45%	20% —25%
Litharge	52.23%	25%	—27.23%	Zinc wares	45%	20% —25%
Red lead	60.35%	25%	—35.35%			
White lead	38.01%	25%	—13.01%			
ACETATES OF LEAD—						
White	3c. lb.	1 1/4c. lb.	— 1 1/4c. lb.	Article.	Old Rate.	New Rate. Inc. or Dec.
Brown, yellow or gray...	2c. lb.	1c. lb.	— 1c. lb.	Acetic acid	23.34%	Free —23.34%
Nitrate of lead.....	2 1/4c. lb.	1 1/4c. lb.	— 1c. lb.	Arsenic acid	Free	Free None
Chromate of potash.....	2 1/4c. lb.	1c. lb.	— 1 1/4c. lb.	Carbolic acid	Free	Free None
Chlorate of potash.....	2c. lb.	1/2c. lb.	— 1 1/2c. lb.	Chromic acid	11.18%	Free —11.18%
Cyanide of potash.....	12 1/2c. lb.	Free	—12 1/2c. lb.	Fluoric acid	Free	Free None
Nitrate of potash.....	1/2c. lb.	\$7 per ton	— 2.39%	Hydrofluoric acid	Free	Free None
Potash-permanganate	25%	1c. lb.	—10%	Hydrochloric or muriatic		
Red prussiate of potash....	8c. lb.	2c. lb.	— 6c. lb.	acid	Free	Free None
Same yellow	4c. lb.	1 1/4c. lb.	— 2 3/4c. lb.	Nitric acid	Free	Free None
Bismuth salts, etc.....	.....	10% (A)	(A)	Phosphoric acid	Free	Free None
Bicarbonate of soda.....	5/8c. lb.	1/4c. lb.	— 5/8c. lb.	Phthalic	Free	Free None
Bichromate of soda.....	1 3/4c. lb.	3/4c. lb.	— 1c. lb.	Prussic acid	Free	Free None
Carbonate of soda.....	1/4c. lb.	1/4c. lb.	— 1/4c. lb.	Sulphuric acid	19.11%	Free —19.11%
Chlorate of soda.....	1 1/2c. lb.	1/2c. lb.	— 1c. lb.	Amomonia, sulphate of.....	Free	Free None
Caustic soda	1/2c. lb.	1/4c. lb.	— 1/4c. lb.	Arsenic and orpiment.....	Free	Free None
Nitrate of soda.....	2c. lb.	1/2c. lb.	— 1 1/2c. lb.	Asbestos, unmanufactured ..	Free	Free None
Phosphate of soda.....	25%	1/4c. lb.	—10.29%	Blue vitriol	4.65%	Free —4.65%
Sulphite of soda.....	25%	1/4c. lb.	— 7.30%	Verdigris	Free	Free None
Sal soda	1/6c. lb.	1/8c. lb.	—1/24c. lb.	Borax, crude	11.82%	Free —11.82%
Refined borax	2c. lb.	1/8c. lb.	— 1 7/8c. lb.	Brass, old brass.....	Free	Free None
Glauber salts	\$1 ton	\$1 ton	None	Cadmium	Free	Free None
				Acetate of calcium.....	55c. lb.	Free —55c. lb.
				Sand blast machines.....	15%	Free —15%
				Chromium, crude	5%	Free —5%
				Copper, composition metal..	Free	Free None
				Copper ore and matte.....	Free	Free None
				Copper regulus and cement..	Free	Free None
				Old copper	Free	Free None
				Copper pigs, ingots, bars		
				plates and composition		
				metal	Free	Free None

SCHEDULE C.

METAL AND MANUFACTURERS OF METAL.

Article.	Old Rate.	New Rate.	Inc. or Dec.
Aluminum, crude	56.41%	2c. lb.	—39.61%

	Old Rate.	New Rate.	Inc. or Dec.
Copperas or sulphate of iron	15/100c. lb.	Free	-15/100c. lb.
Cryolite	Free	Free	None
Benzoin, gamboge and mastic gum	Free	Free	None
Resin gum, crude	Free	Free	None
Gum tragacanth	Free	Free	None
Iridium, etc., combinations ..	Free	Free	None
Paris green and London purple	15%	Free	-15%
Phosphorous	18c. lb.	Free	-18c. lb.
Caustic potash, refined	1c. lb.	Free	-1c. lb.
Arsenate of soda	1c. lb.	Free	-1c. lb.
Cyanide of soda	Free	.....	.....
Sulphate of soda	\$1 ton	Free	-\$1 ton
Silicate of soda	3/8c. lb.	Free	-3/8c. lb.
Soda ash	1/4c. lb.	Free	-1/4c. lb.
Nitrate of soda	Free	Free	None

GOVERNMENT NEEDS

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., October 28, 1913, and publicly opened immediately thereafter, to furnish at the navy yard, Mare Island, San Francisco, Cal., brass and copper pipe composition tubes. Applications for proposals should refer to Schedule 5912. Blank proposals will be furnished upon application to the navy pay office, San Francisco, Cal., or to the Bureau. T. J. Cowie, Paymaster General, U. S. N.

METAL MARKET REVIEW

NEW YORK, October 6, 1913.

COPPER.

The copper market during the month of September was very active for the first half of the month and the advance that was established during the first ten days was well held, and second hands did not seem to have any copper or did not care to sell short on the strong statistical position of the metal. The buying was very heavy and one of the larger producers was early sold out for October and prices were firm at 16 7/8, delivered, for Electrolytic. The buying later in the month has not been quite so active and some second hands have been shading prices and trying to break the market with lower offers, and some small sales have been made at possibly 1/4 cent per hundred pounds below the leading producers' prices.

Statistically the market is stronger than ever. According to the European figures, published today, the total visible supply in England and the Continent has decreased during the month 8,300 tons or over 18,000,000 pounds, and during the month of August the American stocks, according to the Copper Producers' figures, published September 8, decreased over 15,000,000 pounds; and with the heavy exports of over 34,000 tons, it is expected the American figures for the month of September will show a further decrease.

The market is decidedly firm today on an advance of over £1 in London, and there is very little "second hand" copper offering and Producers' prices are unchanged at 16 7/8, delivered, for Electrolytic, with high grade casting selling at very little below.

TIN.

The tin market has been more or less unsettled and prices at the close are about 1 3/4 cents below those ruling on September 1. The consumption for the month was comparatively light, only 3,100 tons against 3,600 tons in August. Prices today around 41 1/4 cents against 42 3/4 August 1.

LEAD.

The Trust price of 4 3/4 cents New York basis has been held all the month; independent sellers are shading this from 5 to 10 points, and the market is dull at 4.65 to 4.70 New York, and 4 1/2 East St. Louis.

SPELTER.

The advance in spelter did not hold and prices today are nearly 1/2 cent per pound lower. New York is quoted at 5.60 to 5.65 and East St. Louis at around 5.45.

ALUMINUM.

The market has been very irregular and prices today are

a shade easier than in August. Domestic ingots, 98-99 per cent., at 21 1/2 to 22, with aluminum in bond quoted at around 18 cents.

ANTIMONY.

Prices are about the same as in August, Cookson's 8.30, Hallett's 7 3/4 to 8 cents, Hungarian grade 7 1/4 cents.

SILVER.

The silver market has been firmer and prices are nearly 2 cents an ounce higher in New York and 1 penny higher in London.

QUICKSILVER.

The market has been held steady at \$39 per flask for wholesale lots and \$39 1/2 to \$40 for jobbing lots.

PLATINUM.

Very little change in platinum and prices are quoted at \$44 to \$45 for ordinary and \$49 to \$50 for hard.

SHEET METALS.

There has been no advance in sheet copper or brass. Sheet copper is quoted at 22 cents base, wire 17 3/4 cents base, and high sheet brass at 16 cents base.

OLD METALS.

The market was active and good prices were obtainable during the early part of September, but lately buyers have not been so eager and prices are made easier.—J. J. A.

AUGUST MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	17.00	16.25	16.75
Electrolytic	16.85 1/2	16.25	16.65
Casting	16.65	15.85	16.40
TIN	43.90	41.15	42.50
LEAD	4.75	4.65	4.75
SPELTER	5.90	5.65	5.85
ANTIMONY (Hallett's)	8.00	7.75	7.85
SILVER	62.00 1/8	59.00 1/8	60.64

WATERBURY AVERAGE

The average price of Lake Copper per pound as determined monthly at Waterbury, Conn.

1912—Average for year, 16.70. 1913—January, 17; February, 15.50; March, 15 1/8; April, 15.75; May, 15 7/8; June, 15 3/8; July, 14 3/4; August, 15 5/8; September, 16 7/8.

COPPER PRODUCTION

Figures for September and October will be published in November.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of \$10. The price of the Report alone is \$10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

Metal Prices, October 6, 1913

METAL PRICES.		Price per lb.
		Cents.
COPPER—PIG AND INGOT AND OLD COPPER.		
Duty Free. Manufactured 2½c. per lb.		
Lake, carload lots, nominal.....	17.00	
Electrolytic, carloads lots.....	16.75	
Castings, carload lots.....	16.63	
TIN—Duty Free.		
Straits of Malacca, carload lots.....	41.25	
LEAD—Duty Pig. Bars and Old, 25%; pipe and sheets, 25%. Pig lead, carload lots.....		
	4.70	
SPELTER—Duty 15%. Sheets, 15%.		
Western, carload lots.....	5.70	
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.		
Small lots, f. o. b. factory.....	25.00	
100 lb. lots, f. o. b. factory.....	24.00	
Ton lots, f. o. b. factory.....	22.00	
ANTIMONY—Duty free.		
Cookson's cask lots, nominal.....	8.30	
Hallett's cask lots.....	7.75	
Hungarian grade.....	7.25	
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.		
Shot, Plaquettes, Ingots. Blocks according to quantity.....	40 to 45	
ELECTROLYTIC—3 cents per pound extra.		
MANGANESE METAL—Duty 10%.....	.90	
MAGNESIUM METAL—Duty 3 cents per pound and 25% ad valorem (100 lb. lots).....		
	1.50	
BISMUTH—Duty free.....	2.00	
CADMIUM—Duty free.....	.90	
CHROMIUM METAL—Duty free.....	.98	
QUICKSILVER—Duty 10%.....	.54	
Price per oz.		
GOLD—Duty free.....	\$20.67	
PLATINUM—Duty free.....	45.50	
SILVER—Government assay bars—Duty free.....	.61	

INGOT METALS.		Price per lb.
		Cents.
Silicon Copper, 10%.....according to quantity	27 to 32	
Silicon Copper, 20%.....	34 to 36	
Silicon Copper, 30% guaranteed.....	36 to 38	
Phosphor Copper, guaranteed 15%.....	23 to 29	
Phosphor Copper, guaranteed 10%.....	23 to 27	
Manganese Copper, 25%.....	25 to 29	
Phosphor Tin, guaranteed 5%.....	61 to 63	
Phosphor Tin, no guarantee.....	46 to 49	
Brass Ingot, Yellow.....	11¼ to 12¼	
Brass Ingot, Red.....	15½ to 15¾	
Bronze Ingot.....	14 to 14½	
Manganese Bronze.....	18½ to 20	
Phosphor Bronze.....	20 to 23	
Casting Aluminum Alloys.....	20 to 23	

PHOSPHORUS—Duty 18c. per lb.	
According to quantity.....	30 to 35

OLD METALS.		Dealers' Selling Prices.
Buying Prices.		Cents per lb.
14.00 to 14.25	Heavy Cut Copper.....	15.25 to 15.50
13.75 to 14.00	Copper Wire.....	15.00 to 15.25
12.25 to 12.50	Light Copper.....	14.00 to 14.25
11.75 to 12.25	Heavy Mach. Comp.....	13.75 to 14.00
9.00 to 9.25	Heavy Brass.....	10.00 to 10.25
7.25 to 7.50	Light Brass.....	8.50 to 8.75
7.50 to 8.00	No. 1 Yellow Brass Turnings.....	9.25 to 9.50
11.00 to 11.50	No. 1 Comp. Turnings.....	12.00 to 12.50
4.00 to —	Heavy Lead.....	— to 4.40
3.75 to —	Zinc Scrap.....	4.40 to 4.50
6.00 to 7.00	Scrap Aluminum Turnings.....	8.00 to 9.00
13.00 to 14.00	Scrap Aluminum, cast, alloyed.....	15.00 to 16.00
15.00 to 16.00	Scrap Aluminum, sheet (new).....	17.00 to 18.00
23.00 to 24.00	No. 1 Pewter.....	25.00 to 26.00
20.00 to 23.00	Old Nickel.....	23.00 to 26.00

PRICES OF SHEET COPPER.

BASE PRICE, 22 Cents per Lb. Net.

SIZE OF SHEETS.		Extra in Cents per Pound for Sizes and Weights Other than Base.									
Width.	LENGTH.	Base	Base	Base	Base	1 ½	1 ½	2	2 ½		
Not wider than 80 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1 ½	1 ½	2	2 ½		
	Longer than 72 inches. Not longer than 96 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4 ½	
	Longer than 96 inches. Not longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	5	7
	Longer than 120 ins.	Base	Base	Base	Base	1 ½	1 ½	2	3	5	7
Wider than 80 ins. but not wider than 86 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 96 inches. Not longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
Wider than 86 ins. but not wider than 48 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 96 inches. Not longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
Wider than 48 ins. but not wider than 60 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 96 inches. Not longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
Wider than 60 ins. but not wider than 72 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 96 inches. Not longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
Wider than 72 ins. but not wider than 108 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 96 inches. Not longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
Wider than 108 ins. but not wider than 120 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 96 inches. Not longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
Wider than 120 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 96 inches. Not longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6
	Longer than 120 inches.	Base	Base	Base	Base	1 ½	1 ½	2	3	4	6

The longest dimension in any sheet shall be considered at its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from.....	3c.
CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from.....	3c.
COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices.....	1c.
COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices.....	3c.
COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.	
ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper.....	1c.
ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper.....	3c.
For Polishing both sides, double the above price.	
The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.	
COLD ROLLED COPPER, prepared suitable for polishing, same price and extras as Polished Copper.	
ALL PLAMISHED COPPER, advance per square foot over the prices for Polished Copper.....	1c.

ZINC—Duty, sheet, 15%.	Cents per lb.
Carload lots, standard sizes and gauges, at mill.....	8 less 8%
Casks, jobbers' prices.....	8½c.
Open casks, jobbers' prices.....	9c.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.
 Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.